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**1921**

PROCEEDINGS  
OF THE  
STATE HORTICULTURAL  
ASSOCIATION OF  
PENNSYLVANIA  
FOR  
1921

SIXTY-SECOND ANNUAL MEETING  
HELD IN HARRISBURG  
JANUARY 26 and 27

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 Wolper, D. L. .... Norristown, Pa.  
 Woodley, C. A. .... Benton Harbor, Mich.  
 Worthington, H. R. .... Route 4, West Chester, Pa.  
 Wotring, Oscar .... Siegersville, Pa.  
 Wrightstone, N. E. .... Camp Hill, Pa.  
 Yoder & Handrich .... Orrtanna, Pa.  
 Yohe, George S. .... 146 E. Street, Spring Grove, Pa.  
 Yohe, Thomas E. .... Spring Grove, Pa.  
 Zimmerman, H. S. .... New Holland, Pa.



## CONSTITUTION

Article 1.—**Name and Object.** The name of this organization shall be The State Horticultural Association of Pennsylvania. Its object shall be to foster and encourage the development of horticulture in the State of Pennsylvania.

Article 2.—**Membership.** Any person may become an Annual Member of this Association by paying two dollars (\$2.00) to the Secretary, such membership to expire on the first day of the following annual meeting, unless renewed. Any one paying twenty dollars (\$20.00) to the Secretary at one time shall be entitled to Life Membership. Persons of distinguished merit in horticulture may be elected to Honorary Membership for the current year, by a majority vote of the members present at any regular meeting.

Members of County or Local Horticultural Societies shall be granted membership in the State Association under the following conditions:

(1) The County, Local or District Society shall have at least twenty-five paid up members, and shall hold at least one meeting a year.

(2) The Secretary of the County, Local or District Society shall remit to the Secretary of the State Association annually one dollar for each member before January 31 of each year which shall be their dues in the State Association for the year.

(3) The Secretary of the County, Local or District Society shall transmit to the Secretary of the State Association annually, at the call of the State Secretary, a list of its officers and members together with a brief report of its work, particularly of those matters that are of general interest to the Horticulturists of the State.

(4) The State Horticultural Association shall publish these Reports in its Proceedings which shall be distributed to the membership of those County, Local or District Societies that have complied with these provisions.

Article 3.—**Officers.** The officers shall consist of a President, three Vice-Presidents, a Secretary and a Treasurer, all of whom shall be elected by ballot at each annual meeting, to hold office for one year or until their successors shall be chosen, except that the retiring Secretary shall edit the report of the annual meeting at which his successor is elected. No one may serve as President for more than two consecutive terms. These elective officers shall constitute an Executive Board in conjunction with an additional indeterminate number of Vice-Presidents whose names shall be announced by the Secretary at the annual election of officers. These Vice-Presidents shall be the regularly elected Presidents of any County Associations, organized in

Pennsylvania for horticultural purposes, whose Constitution is approved by the Executive Board, and whose income from annual membership dues during the preceding year was not less than ten dollars (\$10.00). In order to secure admittance to this Board, the Secretary of such County Association shall certify to the Secretary of the State Association that the applicant has been duly elected to serve as their President for the current year and shall also submit a statement showing number of members and amount of dues paid for the preceding year. All officers must be members of the Association in good standing at the time of their election and shall assume their duties at the close of the meeting at which they were elected.

Article 4.—**Quorum.** Twenty-five (25) members of the Association and five (5) members of the Executive Board shall constitute a quorum for the transaction of business.

Article 5.—**Standing Committees.** The following Standing Committees shall be appointed by the President to serve during his term of office: A Committee on Legislation, to consist of three (3) members; a Committee on Exhibitions, to consist of five (5) members; a Committee on Membership, to consist of one (1) member from each County in the State showing evidence of horticultural activity, and a General Fruit Committee, consisting of one from each County represented, with a general chairman of the whole, each member of the General Fruit Committee to have the privilege of appointing two assistants.

Article 6.—**Annual Meeting.** The Annual Meeting of this Association shall be held during the month of January in each year, at such time and place as the Executive Board shall determine. The regular meetings of the Association shall be closed to all persons, except paid-up members of the Association, speakers, delegates from associations outside of Pennsylvania, all ladies, and the minor sons of members.

Article 7.—**Amendments to the Constitution.** This Constitution may be amended by a two-thirds vote of the members present at any annual meeting, provided such amendment shall have been presented to the Secretary in writing at least sixty (60) days prior to time of holding the annual meeting, and by him referred to all members in connection with the announcement of said meeting.

## BY-LAWS

Article 1.—**Duties of the President.** The President shall be the executive officer of the Association and of the Executive Board, and shall preside at all meetings of either body designating one of the Vice-Presidents to serve in his



stead when necessarily absent. He shall pass upon all bills and accounts of the Association before they are ordered paid by the Secretary; he shall appoint all delegates to other associations and all special and standing committees of the Association unless otherwise ordered.

**Article 2.—Duties of Vice-Presidents.** The Vice-Presidents shall serve on the Executive Board and any one of them may be called upon by the President or the Executive Board to assume the duties of the Chair at any meeting. They shall also actively represent the Association in its various lines of work in their respective counties.

**Article 3.—Duties of the Secretary.** The Secretary shall be the recording, corresponding, and accounting officer of the Association and of the Executive Board; he shall incur no expenditure of a large or doubtful character without the sanction of the Business Committee; he shall secure the written approval of the President on all bills or claims against the Association before drawing his order on the Treasurer for the payment thereof; he shall attend all meetings of the Association and of the Executive Board and shall keep a faithful record of their proceedings; he shall sign all certificates of membership and all Diplomas and Certificates of Merit, awarded by the Association. All money received by him shall be promptly paid to the Treasurer. He shall have charge of the Association's books and papers and shall be responsible to the Board for all property placed in his charge; he shall be the custodian of the Seal of the Association, and shall have authority to affix same to documents when needful; he shall seek by all suitable means to secure the fullest announcement of the meetings of the Association in this State, as well as in adjacent States, when such shall be found desirable. It shall also be his duty, yearly, to prepare for publication, the Annual Report of the Association, together with such other matter as he shall deem proper, he being aided in the selection of such matter by an advisory committee of the Executive Board. As recompense, the Secretary shall receive all necessary expenses, and such salary as may be determined by the Executive Board.

**Article 4.—Duties of the Treasurer.** All the funds of the Association shall be paid into the hands of the Treasurer; he shall disburse the moneys of the Association that shall come into his hands only upon order of the Secretary, countersigned by the President; he shall keep the moneys received by the Association for Life Memberships as a distinct fund, and shall invest the same under the advice and direction of the Executive Board, applying only the interest accruing thereon to the purpose of the general fund. Immediately upon assuming his office and before entering upon his duties, he shall execute to the Association an official bond with sufficient securities conditioned for the

safe-keeping and disbursement of the moneys of the Association, and for the proper discharge of the further duties of his office, in such sum as shall be specified by the Executive Board, the premium on which shall be paid by the Association. This bond shall receive the approval of the President, and shall be deposited with the Secretary. Immediately preceding the annual meeting, he shall submit to the Executive Board a written report showing the amount of money that shall have come into his hands during the year, the sources from which it has been derived, and the disposition made of the same. This statement shall be published in the Annual Report of the Association.

**Article 5.—Duties of the Executive Board.** The Executive Board shall enact all rules and regulations for the management of the affairs of the Association, determine the salaries of its officers, and assume the control and management of its exhibitions; it shall have power to displace any officer of the Association for neglect of duty or abuse of position; shall fill all vacancies by appointment to continue until the next annual election; and shall hold at least two (2) regular sessions during the year, one of which shall occur at the time and place of the Annual Meeting of the Association. It may hold other meetings when called by the Secretary under the advice or direction of majority of the members of the Board at such times and places as may be deemed most convenient, but in all such cases, each member must be duly notified of the time, place, and object of such meeting; it shall carefully guard the interests of the Association, watch over its finances and provide for its necessities as they shall arise; it shall appoint from its own number three members, who shall constitute a Business Committee for the year, and upon which the Secretary and Treasurer may not serve; and it shall submit to the Annual Meeting, through the Secretary, such report upon the condition, general interests, and prospects of the Association as it shall judge necessary or expedient. All important measures shall be submitted to this Board, but may, by the Board, be resubmitted to the Association for recommendations.

**Article 6.—Duties of the Business Committee.** It shall be the duty of the Business Committee, upon application of the Secretary, during the recess of the Executive Board, to advise with him as to the expediency of making any contemplated but questionable expenditure for which occasion may arise during such recess. The Business Committee shall also audit the accounts of the Secretary and the Treasurer just prior to the annual meeting and submit written report of its findings to the Executive Board.

**Article 7.—Duties of the Standing Committees.** (1) The Committee on Legislation shall inform itself in regard



to such existing laws as relate to the horticultural interests of the State and bring the same to the attention of the Association, at the same time reporting any additional legislation which in their judgment is desirable; when so directed by the Association, it shall cause to be introduced into the State Legislature such bills as may be deemed necessary and shall aid or oppose any bills introduced by others which directly or indirectly affect the interests of the fruit grower.

(2) The Committee on Exhibitions shall suggest from time to time such methods and improvements as may seem to them desirable in conducting the exhibitions of the Association, as well as other fruit exhibitions throughout the State, and with the assistance of the Executive Board, shall arrange the premium lists, and have charge of all the exhibitions of the Association.

(3) The Committee on Membership and Expansion, with the co-operation of the County Vice-Presidents, shall bring the work of the Association to the attention of fruit growers throughout the State, and by such means as they deem best, strive to increase the membership.

(4) The General Fruit Committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports.

Such other Standing Committees may be created by the Executive Board from time to time, as in its discretion may seem desirable or necessary.

All Standing Committees shall report to the Annual Meeting in January, any information of value to the Association or its members, that may have come to their knowledge during the year, as well as any scientific theories, deductions or facts that in their opinion may be useful in advancing the object for which the Association is laboring.

**Article 8.—Nomenclature.** The Association shall adopt the nomenclature of the American Pomological Society.

**Article 9.—Amendments to By-Laws.** Amendments or additions to these By-Laws may be made by a majority vote of the Executive Board at any meeting, but if objection shall be made, the same shall "lie upon the table" till the next regular meeting of the Board. These By-Laws, or any one or more of them, may be suspended for the time, by order of a majority of all the members of the Association present and voting. A proposition in the general meeting of the Association for an amendment or addition to these By-Laws shall be referred to the Executive Board for consideration and decision, but the Association may submit therewith its advice or request.





VIEW OF FRUIT EXHIBIT. STATE FARM PRODUCTS SHOW, HARRISBURG, PA., JAN. 25, 26, 27, 28, 1921

## THE SUMMER TRIP OF 1920

By H. F. Hershey, Secretary.

Since the last Annual Report was printed in 1917 there have been three Summer trips which have been highly successful. The 1918 Summer Trip started at Chambersburg, and two days were spent in the orchards of Franklin and Adams counties. The trip then led to Winchester, Virginia, where we joined with the Virginia Society in visiting the orchards around Winchester, Va., and Martinsburg, West Virginia. The trip finally broke up at Hancock, Maryland.

The 1919 trip started at Bustleton near Philadelphia in a vegetable growing section, and the rest of the trip was in New Jersey. In the Glassboro section we found orchard rows a mile in length. From Glassboro the trip led through the Haddonfield-Moorestown section and finally wound up for the night at Trenton. At Freehold we joined the New Jersey Society in their tour of Monmouth County. Conditions here were certainly different from Pennsylvania in that there is plenty of sand and no hills of any account. The night of the second day was spent at Asbury Park and the following day the Pennsylvanians gradually left for their homes.

The success of these two summer trips was largely due to the courtesy and co-operation of the Virginia and New Jersey Societies. Everyone who took the trips was very well pleased and felt amply repaid for the time and money spent. Our growers found out that they were not the only ones who had problems, but that our neighbors had them as well.

In 1920 we staid at home in Pennsylvania. The trip was started in southeastern Berks County at Boyertown at the Dr. Funk orchard, which is now operated by his son-in-law, H. L. Breidenbaugh. The same day the State Hill orchards, Wernersville, owned by Mr. John Rick, of Reading, were visited, as well as the orchard of Mr. David Meyer, Annville, and the East End Fruit and Truck Farms of Mr. R. J. Walton at Hummelstown. The night was spent in Harrisburg and the following day we left for York for the dedication of the York Imperial marker. Enroute we visited the very well cared for orchard and truck gardens of Mr. Levi Hartman in York County. While not an extensive grower Mr. Hartman is very painstaking and gets results.

August 18th, 1920, will always stand out as a red letter day in the history of the Society. It is altogether fitting and proper that we should have dedicated this marker to the York Imperial apple, a Pennsylvania production, which has given a livelihood, wealth, and happiness to a multitude of people. As Dr. Fletcher says, "It is dependable and it is this dependability which makes it a prime favorite among



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the fruit growers of Pennsylvania, Maryland, Virginia, and West Virginia." This marker which was erected on Springwood Farms, along the Baltimore pike, two miles south of York, is at a prominent place and will be seen by many people. It will serve to show for many years our appreciation of the York Imperial apple and its propagator, Jonathan Jessup.

The program for the day was arranged by the Dedication and Marker Committee, consisting of the following members: Dr. S. W. Fletcher, State College, Chairman; C. Arthur Griest, Guernsey; H. C. Brinton, Hanover. The program with President Fenstermacher presiding, was as follows:

Address—Honorable Edward E. Beidleman, Lieutenant Governor of the Commonwealth of Pennsylvania.

Address—Honorable Frederick Rasmussen, Secretary of Agriculture of the Commonwealth of Pennsylvania.

Address—Mr. John C. Schmidt, owner of Springwood Farms where the first York Imperial apple was propagated.

Address—Mr. Jonathan Jessup, grandson of the original propagator of the York Imperial.

Address—Dr. S. W. Fletcher, State College, Pa., Chairman of the Dedication and Marker Committee.

Address—Mr. C. J. Tyson, Flora Dale, Pa.

Many thanks are due the owner of Springwood Farms, Mr. John C. Schmidt, for his many courtesies and his help in the erection of the Marker. He co-operated very fully with the Dedication and Marker Committee and gave freely of his time and labor in the gathering of the materials. As a host he was most congenial and we carried away many pleasant memories of our visit. The best that we can wish him is his share of the happiness which has been given and will continue to be given to man by the York Imperial Apple.

After the Dedication ceremonies the trip was continued into Adams County. Unfortunately the day was very rainy and not many stops could be made. There is always something to be learned from seeing the Adams County orchards, and this trip was no exception. Our thanks are due the Adams County Growers and the Farm Bureau for arranging the trip and working out the details.

Are these Summer Trips worth while? Those who have taken them say they are. Take the next one with us and you will never regret it.





THIS TRIBUTE TO THE YORK IMPERIAL APPLE HAS BEEN PLACED ON  
 SPRINGWOOD FARMS, ABOUT TWO MILES NORTH OF YORK,  
 ALONG THE BALTIMORE PIKE. SPRINGWOOD FARMS  
 ARE OWNED BY MR. JOHN C. SCHMIDT, OF YORK.

## THE YORK IMPERIAL APPLE

WAS FIRST PROPAGATED ABOUT 1820  
 IN THIS FIELD BY

JONATHAN JESSOP

IT IS THE MOST WIDELY KNOWN VARIETY  
 OF PENNSYLVANIA ORIGIN AND HAS  
 CONTRIBUTED LARGELY TO THE  
 HORTICULTURAL PROSPERITY OF THE STATE

A TRIBUTE BY  
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## A TRIBUTE TO THE YORK IMPERIAL APPLE

By S. W. Fletcher,

Professor of Horticulture, The Pennsylvania State College.  
Springwood Farms, York, Pa., Aug. 18, 1920.

We have met to pronounce a eulogy on a friend. Happily for us our friend, the York Imperial apple, is living, not dead; we dedicate this memorial to its promise for the future as well as to its achievements in the past. An apple, like a man, must have certain qualities of greatness to call forth the tribute that we pay to-day. The apple growers who have gathered here, from several States, will tell of these, each from his own experience. I shall mention but one—it is dependable. That is why I call it our friend the York Imperial, for surely the quality that we prize most in a friend is that of stability; we like to feel that we can depend on him. The York is not beautiful, like the Jonathan; not shapely, like the Rome; not rich-flavored, like the Stayman; not precocious in bearing, like the Duchess; but it is dependable. It can be counted on to fill the barrels. It has the solid, homely virtues of the common people. Like a human friend, it will even stand some neglect without rebellion, but responds gratefully to considerate treatment.

Of course it has its faults; but it is as futile to expect perfection in an apple as in a man. Some of our friends have perverse periods which we tolerantly call their "off days." Our affection for the York is not dimmed, even through its frequent "off years." There are a few other flaws, but why dwell on them when they bulk so small in comparison with the great weight of real worth?

It is this quality of dependability that has made the York a variety of national prominence. It is grown to a considerable extent in sixteen states and is a dominant variety in four states—Pennsylvania, Maryland, Virginia and West Virginia. The United States Department of Agriculture estimates that about 3% of the total commercial apple crop of the country is York, totaling from 1,500,000 to 3,000,000 barrels annually. A recent survey by the Pennsylvania State Department of Agriculture and the Department of Horticulture of State College showed that in the counties of Adams, Franklin, Cumberland and York there are 16,363 acres of commercial apple orchard, of which 6,426 acres, or 38%, are York. Surely we can say that the York is not without honor in its own country.

We sound the praises of the York as a money-maker, yet I would not like to think that the tablet we dedicate to-day represents a sentiment wholly commercial. Money and the means of making money have value only as they minister to the happiness and usefulness of man. I am thinking



not so much of the millions of dollars that are now bending the green branches of York apple trees, from the Susquehanna to the Shenandoah, as of the homes that will be blessed by the harvest. I have spent the past six weeks visiting fruit growers in this and neighboring counties. On many of these farms the York Imperial apple is the key-stone in the arch of prosperity. It has paid off mortgages, built barns, sent the boys to College, installed modern conveniences in the house and brought happiness and comfort to the home. Let us thank God for our friend, the York Imperial apple. He gave it to us, unsought. Like the Baldwin apple, the Concord grape and other great varieties that have blessed the world, it was not the product of the plant breeder, but merely a chance seedling springing up in a neglected fence corner. This memorial of enduring limestone, which so well typifies the region in which the York was born and has come to fullest fruition, is an expression of our esteem for Jonathan Jessup, who first propagated the variety of this spot one hundred years ago. May it also express, in a larger sense, the obligation of the fruit grower to his Creator, the Giver of this and every good and perfect gift.

### THE PRESIDENT'S ADDRESS

P. S. Fenstermacher, Harrisburg, Pa., Jan. 26, 1921.

**President Fenstermacher:** Upon this the Sixty-second Annual Meeting of the Association, we face a most peculiar and distressing situation. An orgy of War, waste, reckless buying and spending, retribution and retrenchment, with stagnation of industries and its accompanying uncertainty and pessimism, all this has brought on an era of under-consumption along all lines. These conditions coupled with a year of bumper crops have consequently brought on a lowering of all values to such an extent that today many prices of Farm Products are below the cost of production.

Take, for example, the main vegetables and fruits—the Potato and Apple. The Potato Crop was never grown at a higher cost for Seed—fertilizing, spraying material and labor at any time in history of agriculture. And yet, the demand is slow and we are selling at loading stations at from 50 to 60 cents per bushel. There is an estimated apple crop over the entire United States of two hundred and forty million bushels, and a commercial crop of thirty-six million barrels, which is a gain of ten million barrels over the 1919 production. The bulk of the increase is in the Eastern States, of which New York has a crop of nine million barrels, as against three million barrels last season. Pennsylvania's increase is in the same proportion, two mil-

lion barrels this year, as against seven hundred and fifty thousand barrels last year.

The Lord only knows the number of bushels of this State's entire crop. It seems as though the farmers' apples, and the supply shipped in bulk apples should some time become exhausted, so as to give us poor but honest commercial growers a chance to dispose of our crops before prices go to nothing. I believe it is beyond contradiction that the production of this year's holdings was never so costly in the history of apple growing, and which is at present selling at prices far from being profitable.

At a meeting of the Virginia Horticultural Society held at Roanoke in 1911, I heard Mr. H. P. Gould, of the United States Department of Agriculture, comment upon the status of the fruit industry at that time by referring to the heavy planting of fruit trees for the past twenty-five years in practically every section of the country. There being hardly a nook or corner anywhere within our borders in which fruit of some kind is not more or less grown, and in some sections where twenty-five years ago fruit culture was thought to be impossible, and even its suggestion was a matter of ridicule, men were finding fruit growing a veritable Eldorado.

We very commonly refer to "the present status of fruit growing." I have been wondering a great deal of late just what the "present status" really is. What is the road that has been traveled in the present development of fruit culture? Whither are we bound in its future development?

In those slangy but sometimes expressive words—"Where are we at in fruit growing?" Have we already reached the period of over-production before half of the more recent heavy plantings are in bearing? With these vast plantings over such a wide extent of territory, can there ever again be a failure of the apple crop? Is it a fact that a total failure in one section cannot materially affect the aggregate crop of the Country? Does calamity stare us in the face? Has the situation as predicted by Mr. Gould ten years ago arrived? What can be done to counteract these seemingly adverse conditions?

The problem is before us, and here at this meeting is the time to devise ways and means for its solution. It may be that there is some over-planting in certain sections by men with more money than practical experience, or where soils and climatic conditions are unfavorable, or railroads and markets are too far distant. However, the products of such orchards will reach some market whether at a profit or loss. So will also the products of thousands of farms and orchards, where trees are growing some apples fit only for hogs and their owners, but alas, too many of which also reach markets at some price to the detriment of the legitimate grower, causing glut and depression of prices.



However, to my mind the increased production and glut of apples at present is not as much over-production as it is under-consumption brought about by too many years of high retailers' prices, which has caused the consumer to class the apple as a luxury to be used only for dessert, and not as an article of food. Quite naturally the mass of the people have lost the apple-eating habit, and not many of the younger generation have acquired it.

They have found substitutes in a more stabilized article of fruit which they soon learned to know, and very convenient for quick service at meals. The quality of this is easily recognized by a novice, and sold in quantity and at prices which meet with the housewife's approval. The banana and citrus fruits, which once were articles of dessert, have now become a necessity as a part of the daily diet to most of the city people, and many of the folks living in the country.

However, with all this popularity of the banana and citrus fruits, it is surprising to see the trouble these growers at present have in disposing of this year's crop. I wish to read the following taken from an Allentown newspaper:

#### **"FLORIDA ORANGE GROWERS FORCED TO UNUSUAL STEPS.**

##### **Fruit So Plentiful, Grove Owners Bring Twenty- Eight Cars to This State and Personally Sell Fruit.**

Allentown in all its history has never satisfied its appetite for oranges as it is doing to-day, for during the past two days the better part of a carload of this fruit has been retailed at the Central freight yards at prices that make even "before-the-war-prices" look large.

The advent of this carload of oranges tells an interesting tale of economic conditions in the farming industry of this country and particularly that branch of it growing.

Oranges are so plentiful in Florida that many of the growers cannot even give their fruit away. Some of

the growers have now taken the unusual step of bringing their products north themselves and disposing of them here, something unprecedented it is believed in the history of Florida orange industry.

At this time there are said to be twenty-eight cars of oranges in this State, each in charge of an owner's representative who came north with the car. Each car is heated with a coal-oil stove, and this has prevented freezing at this time of the year.

The oranges which are of the Florida variety are tangarines or kid glove variety, are of the finest quality and are large, the tangarines especially being twice the size of the oranges of this variety that usually get into this market.

Hundreds of householders yesterday bought oranges of peck. A count of a peck of

Floridas showed forty-three oranges. Some small dealers bought at \$2 a bushel for Florida oranges and at \$2.50 for the tangarines. A count of a bushel of Floridas showed ten dozen oranges."

Now here is a rather severe but very practical method in reaching the consumer and disposing of surplus crops, which is worth giving serious consideration by every apple and vegetable grower. It may be one of the means of bringing the attention of the consuming public to the merits of the apple as an article of food at prices that will tempt them to buy and eat. A supreme effort will have to be made to stabilize the apple business so that when consumers buy apples they know what they are getting, and become satisfied customers instead of disappointed kicks, and get back into the habit of using apples as long as they can get them. A circular letter along these lines was mailed to every member of this association outlining some points which we deemed important for the time being, and we are only too sorry a copy could not be placed into the hands of every grower of apples in the State.

That Pennsylvania can successfully grow apples commercially is no longer an uncertainty. I am convinced with our diversified soils and climatic conditions, we can grow any apple that is worth while, to a higher degree of perfection than can any State or Nation under the Sun. Our imperative requirements are more co-operation in grading and packing, and more efficient organization for the selling of the products of our orchards and farms. We must advertise. Advertising helps others, and will help us. I trust there will be a full and free discussion of this subject at this meeting. There is no topic on our program which is of more vital importance to every fruit grower in the State.

Among the activities of your Association was a very successful summer meeting held during the latter part of August. A two days' trip was made through the orchards of Berks, Lebanon, Dauphin, York and Adams Counties. The viewing of these many well kept orchards and community packing houses were both interesting and instructive, and a very creditable illustration of successful orcharding.

The most notable event of the trip was the placing of a marker by this Association near the site where the first York Imperial Apple tree was propagated by Jonathan Jessup, about the year 1820. The York Imperial is the best known variety of Pennsylvania origin, and has contributed largely to the horticultural prosperity of the southern part of the State. A delegation of prominent Virginia apple growers were present and placed a wreath of Virginia grown York Imperials upon the Monument. This event will become historic in the Annals of the Association, and we will



remember for many days the courteous treatment and lavish entertainment which we received from the present owner of this hallowed spot. All honor to Jonathan Jessup, the originator, and to his worthy successor, Mine Host, John C. Schmidt, of York County.

Your President also attended the summer meeting of the New York State Horticultural Society held in the orchards of Mr. Grant Hitchings near Syracuse. Grant Hitchings has acquired quite a reputation by his demonstration of a system of orcharding which he claims is the most economical in existence. It is known as the mulch system and is simply an easy method of tree planting in old sod land by placing holes at certain distances, and the trees given very little, if any attention thereafter, until they come into bearing. What grass and weeds grow up are mowed and let remain as a mulch. Some spraying and dusting are done when trees come into bearing.

That this system is one of the shortest cuts and least costly of any known is self-evident, and when you consider that the father, two sons and a boy care for nearly 40 thousand trees, with no extra help except at times of picking and packing, when they are assisted by their women folks, you can judge for yourselves that these orchards are not a thing of beauty.

What the results of this kind of treatment will be is problematical. Time alone will tell. Grant Hitchings is very emphatic in his belief that he can produce apples at a profit when most of us fellows are put out of business by the low prices of over-production.

It is with no great pleasure that I stand before you today as President, to make the customary annual address. Certain promises were made to print and distribute a report of the last annual meeting which were not fulfilled. And as Mr. Hershey remarked—"Makes a fellow ashamed to show his face."

However the facts are that this was not the fault of your officials, but was caused primarily by the small cash balance in hands of the Treasurer which we thought it unwise to deplete before we had exhausted every effort to increase the association's revenues by a larger membership.

A campaign for 1,000 membership was inaugurated. Mr. Harold Schantz of Allentown very kindly consented to take charge of the same without any remuneration. Your officers have taken the liberty to appoint him Membership Secretary.

Mr. Shantz mailed a circular letter to every known fruit and vegetable grower in the State, and the membership was increased by over a hundred new names. While we fell short of reaching our goal, we are not as yet discouraged, and have devised several plans, which we will be glad to advise our successors in office if they so desire. With

a life membership of 149 names from whom we derive no annual revenue, and an annual membership of only 206 names, it must be apparent to you that if this association is to properly assist and benefit the industry which it represents, it is imperative that the first step must be to devise ways and means to increase its annual receipts, either by a State appropriation, increased membership fees, or a much larger annual membership.

The latter proposition being the most feasible, we have outlined a plan by which the life members may become useful as well as ornamental. If this Association is to adequately benefit its members, there must be enough funds at the disposal of its officials so that reports of the proceedings of all its meetings and bulletins on timely topics can be issued to every member. If this organization is to be the official representative of the interests of the great fruit and vegetable industry which has rapidly become second in value to no other interest in the State, every member, whether life or annual, should consider himself a special committee on increased membership and be on the job "In Season" and "Out of Season" soliciting new members.

Unless the revenues of this association are increased to not less than Five Thousand Dollars annually, I do not see how it can render the service that this industry requires at this critical period. To advertise Pennsylvania apples the amount should be twenty times this amount.

This Association is no longer a society debating the origin and names of varieties. It must be prepared to do things upon a large commercial scale, and have a larger vision of big things in the future. Only by a concerted effort of all those engaged in this great business, is it possible to make it worth while to have a State Horticultural Association to continue the good work instituted by the eminent men who were its founders.

Mr. Fenstermacher: I now wish to introduce Mr. A. Freeman Mason, of the New Jersey Experiment Station, who will address us on the Peach Borer.

#### PARADICHLOROBENZENE AND ITS USE IN CONTROLLING PEACH TREE BORERS.

By A. Freeman Mason,  
N. J. Agricultural Experimental Station,  
New Brunswick, N. J.

Mr. President and Friends:—

The unfortunate absence of Mr. Blakeslee has given me an unexpected pleasure. Having been connected with the Pennsylvania State College for so many years, I rather feel at home in these meetings of the Pennsylvania State Horti-



cultural Society and it is good to be able to look again into these friendly faces. However, I regret very much that Mr. Blakeslee cannot be here, or that Dr. Alvah Peterson, of the New Jersey State Experiment Station, could not be here to tell you first hand of their experiments and experiences with the use of Paradichlorobenzene for the control of the Peach Root Borer.

Paradichlorobenzene is a white crystalline substance, insoluble in water, which slowly gives off a colorless gas which is much heavier than air, at temperatures above 50 degrees Fahrenheit, and which has poisonous properties. The material looks like Epsom Salts, and smells something like naphthalene mothballs, or peach kernels. Its use in the control of peach borers was first made successful by Mr. E. R. Blakeslee, of the United States Department of Agriculture. Since that time the material has been tried out in an experimental way in a few experiment stations, and in a commercial way in certain parts of the East. In New Jersey we have been using it in a demonstrational way this past year, having over four thousand trees under treatment on soil types ranging from the lightest of white sands to the heaviest of red clays. The experiments have all been highly promising, while the demonstrations and commercial applications have been attended with unusual success.

Three or four features regarding this material stand out prominently. First, it is effective, second, it is very easy to apply, third, it is inexpensive, and fourth it is only recommended for use on PEACH TREES SIX YEARS OLD or OLDER.

Regarding its effectiveness, let me tell of the results of some of the experiments and demonstrations as carried out by the Agricultural College in New Jersey. It was first tried out in New Jersey a year ago last summer, by Dr. Alvah Peterson, after the information was received from E. R. Blakeslee in the form of his bulletin. Various quantities were used on trees of various ages in different soil types. At Clementon on the lightest sands, one ounce per tree was applied in July to trees which had previously been wormed in June. Four weeks later the earth was removed from about the roots to make the evidence of borer injury plain, and a week later the trees were "wormed." On 10 untreated trees, 45 live borers were found, an average of 4.5 borers per tree, while on 10 treated trees, only one live borer was found. At Englishtown, on heavy red clay, on trees which had not been wormed for four years, 10 untreated trees yielded 74 borers, or 7.4 borers per tree, while 10 treated trees in an adjoining row showed not a single live borer. At Haddonfield, a demonstration showed one live borer above the location of the paradichlorobenzene on a dozen or more treated trees examined, while on adjoining untreated trees, 12 were taken from one tree and 7 from

another. These trees were Greensboro's and had been wormed twice a year since being set out. In a dozen other places in the State, similar results have been secured. Therefore we regard it as being effective.

Regarding the ease of application, it is applied on top of the ground, in a narrow band as close to the tree as possible without actually having it touch the bark, but ABOVE THE TOPMOST GALLERIES OF THE BORERS, and two or three inches of earth are thrown on top to cover it up. If the borers are working well up on the trunk, it will be necessary to mound up around the tree, so that the gas when sinking will get into these high galleries. On the other hand, if the borers are deep in the ground it is NOT necessary to dig away any soil although loosening the surface crust will enable the gas to sink down around the roots more readily. Mr. Howard DeCou, of Haddonfield, N. J., estimates that it costs him \$12.50 per acre to worm his trees each time, and that he does it twice a year, while the application of paradichlorobenzene should not cost more than \$2.50 per acre and is only done once. The most important feature however, is that it gets over 90% of the borers without the severe injurious cutting around the roots which attends the old system of worming with a knife.

The material is very inexpensive, from one-half ounce to one ounce of the material being sufficient to do trees of all sizes. At the beginning of the season last summer it cost 15 cents per pound in 150 pound drums, making the cost about 1 cent per tree for material. Toward the end of the season, the price rose to 30 cents per pound. Now it can be secured from the Hooker Electro-Chemical Co., 25 Pine St., New York city, who are quoting it at 25 cents per pound, or from the E. C. Klipstein Sons Co., 344 Greenwich Ave., New York city, who are quoting it at 15 cents per pound in 150 lb. drums. In ordering it be certain to state that it is to be used for peach borers in order to be sure to get the finely ground material. We got some coarse lumpy material by failing to specify this and it was hard to grind.

Its use should be confined to peach trees six years of age and older for the present. Mr. Blakeslee found that a number of one year old trees were killed and several more badly injured by small quantities of the material. On two and three year old trees the injury was less, while on four and five year old trees there was but slight injury, while trees six years old were the youngest upon which no injury was observed. The injury was usually found on the tender surfaces along the sides of the borer galleries, it being evidenced by a darkening of the cambium. Dr. Fletcher and I are using it on our own trees which are but the size of well-grown three year old trees, having been neglected before we purchased the place. The thickness of the bark seems to be the determining factor in injury, a young tree



with thin bark being readily injured. Several New Jersey growers are putting it on four year old trees, considering the chances of injury preferable to the borer injury. However, the N. J. Experiment Station does not recommend its use on trees less than six years old as yet. Experiments are being carried on indicative that soon a method will be evolved whereby it may be used with safety on trees of all ages. Dr. Peterson used small quantities in August on June buds of the previous June, leaving it on for three days to a week, and then scraping it away, with promising results, but he is not ready to make any recommendations as yet. It cannot be used on apple trees, Mr. Blakeslee's experiments having shown that considerable injury results to the tree from its use.

Lastly, the time of application is important. Any insect control measure should be applied before the insect does any damage to be ideally effective. Borer moths emerge in June, July and August, laying eggs in a few days after emerging. Eggs deposition is practically entirely over by Sept. 1, and the young worms hatch out within a few days and shortly thereafter enter the bark. The material should not be applied, therefore, until the borers are about all hatched out; so that August 15 is about the earliest date advisable. The gas lingers in the soil for from four to six weeks so would kill all the late arrivals. On the other hand, the material must be applied early enough so as to have it all out of the ground before the ground freezes, because if it is in the ground over winter the tree will be injured from the long exposure to it. Therefore Sept. 15th is about the latest date advisable for application. Now I realize that this interferes with peach harvest, coming right at the heaviest time. However, there is usually a lull between Champion and Belle and Elberta when the material could be applied, while in most seasons Elberta is over by Sept. 10th, at the latest, leaving a week or so for application. The objection to Spring applications is that the borers do their damage to the tree before being killed and the material cannot be applied early enough to stop this damage, because paradichlorobenzene does not give off gas rapidly at a temperature below 50 degrees and in New Jersey the soil temperature does not reach that point until the middle of May, in the central part of the State, which is comparable to the peach growing section of Pennsylvania. It would be better to apply it earlier in August than to wait until Spring. Only one application per year, from August 15th to Sept. 15th is necessary.

To Summarize—Paradichlorobenzene can be used effectively and safely on peach trees six years old and older, by placing from one-half ounce to one ounce per tree in a narrow band as close as possible without touching the trunk, and above the topmost galleries of the borers, and covering

it with a few inches of earth. It should be applied between August 15 and Sept 15, so as to get all of the borers, and yet be gone from the soil before freezing weather sets in. It is not yet entirely safe for peach trees less than six years old, and not at all safe for apple trees.

**Question:** Are the young, white, very small borers that you see with brown heads all Peach Borers?

**Answer:** There may be some little Thread Worms working in the gum also, but most of them are borers.

**Question:** Just where do you put the paradichlorobenzene?

**Answer:** Put the material as close as you can without getting it against the bark, but for safety's sake both Doctor Peterson and Mr. Blakeslee suggest keeping it away from the bark. The closer to the trunk, and the closer the concentration of gas the better.

**Question:** Do you cover it with dirt?

**Answer:** Always cover it with dirt.

**Question:** When do you apply it?

**Answer:** Put the material on in the Fall. I certainly would not let borers go over a long time. The advantage of putting it on in the fall is that you get the young borers.

**Question:** Just how soon would you put it on?

**Answer:** Put it on as soon as the weather warms up. This will vary. Some Springs we have warm weather earlier, sometimes later.

**Question:** Do I understand that the first year it is all right to use it twice, providing trees have not been wormed before?

**Answer:** On trees of six years you can use it twice. I am not sure about the very young trees.

**Question:** Was the gum previously pulled away from the trees?

**Answer:** Yes, it is easy enough to remove the gum, but I do not know if it is essential. However, it is better to do it.

The announcement of the following Committees was made by President Fenstermacher:

#### RESOLUTION COMMITTEE:

C. Arthur Griest, R. E. Atkinson, Dr. S. W. Fletcher,  
H. L. Breidenbaugh, W. B. Nissley.

#### NOMINATING COMMITTEE:

D. M. Wertz, Chairman; H. C. Brinton, R. P. Lovett.

#### AUDITING COMMITTEE:

E. C. Bowers, Chairman; Jacob L. Reife, C. M. Smith.

Mr. Fenstermacher, I now wish to introduce to you Prof. Hodgkiss, of the State College Extension Service.



## INSECT CONTROL IN APPLE ORCHARDS

H. E. Hodgkiss, Extension Entomologist,  
State College, Pa.

The role which insects play in the economy of plant life is an important subject for discussion at this time. With the extensive planting of orchards, numerous insects have become serious pests of fruit trees, when under normal environment they are of little if any importance. Some of these insects are abundant enough to cause losses only in occasional years, but there are other forms which periodically effect large reductions in the quantities of marketable fruits. Under this head we may list the codling moth, leaf-rollers, plant lice, the red bugs, and the curculio attacking apples; the curculios on plum and quince fruits, and the psylla on pear trees.

Control measures for these annual offenders have been developed during recent years and while much of this discussion can be only a re-statement of methods already in practice, it seems advisable, in order to more thoroughly acquaint the orchardists with these systems, to go over much the same ground as has been covered at previous meetings. By close attention to these discussions the fruit grower will become more familiar with the principles involved and may then be able to more successfully direct his orchard operations against these pests. Unless the individual can learn to apply correct methods to his own conditions, little good will result from spraying.

Among the more important of these annual miscreants which have been abundant in Pennsylvania during the past season, the Rosy Apple Aphis, Apple Red-bugs and Curculio are particularly worthy of discussion at this meeting.

### Rosy Apple Aphis

Plant lice are sucking insects. Injuries from their attacks on fruit trees are due chiefly to the extraction of large quantities of sap from the stems of the young apples at a time when the fruits appear to need considerable quantities of moisture for their development. After the seeds have formed and the type of the fruit has become established, moisture seems to play but a minor part in the shaping of the apples. The excessive withdrawal of sap from the young stems during this period produces small, undersized or misshapen fruits or what are commonly known as "cluster apples."

The eggs of the rosy aphis are deposited during October and November on succulent twigs, in crevices in the bark, or at the bases of the buds. They hatch early in the Spring and the young insects gather on the green tips of the open-

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ing buds. They then develop very rapidly, and about three generations occur before the middle of June. Usually by July 1st, this form leaves the trees for some food plant such as the narrow leaf plantain on which it feeds during the remainder of the summer. During the hatching period the lice are of a dark green color, and offer few distinctive characters by which orchardists can determine the species. As they mature, however, the color changes and a characteristic curling of the leaves serves to indicate the insects' identity. From experiences with recent outbreaks it appears inadvisable to wait until destructive numbers of the insects appear before spraying practices are adopted. Fruit growers in the more extensive apple growing areas are coming to adopt precautionary measures to protect the fruit from probable losses due to this insect. Spraying against the later stages of the pest during the Blossom Pink or Petal Fall conditions of the trees is of little value, as in these periods the lice are amply protected, and the damage in the stems has already commenced.

Among the methods which have been suggested for combatting the pest, the possibilities of the destruction of the eggs has perhaps attracted the most attention. While we have found that there may be a goodly reduction in the hatching of eggs from applications of lime sulphur solution during the dormant period, the results of the applications are not dependable. The ovicidal value of this spray is directly proportional to the maturity of the egg and since there is a considerable variation in this respect, it is seldom possible to make an application which will destroy sufficient numbers of the lice to make the effort worth while. The most serviceable practice and one that has proven efficient in many of our larger commercial orchards is the control, by spraying, for the newly hatched lice. Nymphs hatching from the eggs seek the opening buds of the trees where they remain unprotected for some time. At this period the insects are tender and quite susceptible to contact sprays, while as the leaves unfold there is an opportunity afforded the insects to be protected from the spray.

During the past season a series of demonstrations was conducted in a number of fruit growing counties in which complete control of the rosy aphis was obtained by the delayed dormant spray. Where lime sulphur solution alone was used during this period, the attacks of the lice reduced the crop about one-third. As a result of the tests these orchardists are planning to include the nicotine in the delayed dormant application as they now recognize its place in the economy of orchard practice.

The delayed dormant treatment should be made preferably when the green ends of the more advanced buds are from one-fourth to one-half inch in length. For this spray use nicotine sulphate (Black Leaf 40) in the propor-



tion of three-fourths of a pint to one hundred gallons of diluted lime sulphur solution. It should be applied as a forceful spray, care being taken to thoroughly wet the ends of the buds. With care and attention to the manner of application, little harm should result to the trees from attacks of the lice.

### Apple Red Bugs

The extent of injuries from these insects hardly needs emphasis, as most growers are familiar with the gnarly, misshapen apples due to the attacks of the pests. There are two species of red bugs, but in Pennsylvania our most destructive species is the, so called, false red-bug. In past years spraying practices as recommended have signally failed to give sufficient control. A study of seasonal occurrences of the two species was undertaken at our Field Laboratory, Arendtsville, Pa., to ascertain if there were differences in the seasonal activities which might account for this condition. In these studies it was ascertained that the apple red-bugs hatch during a period following the appearance of color in the blossom cluster buds, and not previous to this time as was generally believed. The development of the nymphs extends beyond the condition recognized as the cluster apple stage, which is ten days or two weeks following the dropping of the petals.

To ascertain if a contact spray applied two weeks after the petal fall application would give added control, a number of tests were made in widely separated areas. These demonstrations showed that where nicotine was omitted in the cluster apple spray, about forty per cent of the fruits were deformed by red-bugs. In all instances where an application was made at the petal fall and cluster apple periods, few losses were experienced from the pests. On the basis of these results a rearrangement of the spraying practice is suggested whereby nicotine is included in the petal fall and cluster apple sprays, and omitted in the application as the blossoms show pink.

### Curculio

On apples especially, this insect seems to have caused the most trouble. Its control on stone fruits appears not to occasion as much alarm as on apples, which may be owing to an unfamiliarity with its habits, or to failures in applying the sprays at critical periods.

Two types of injuries on apples are caused by this insect. In the spring during the oviposition period crescent shaped cuts are made in the young fruits, which later heal over and become russeted and enlarged. Late in summer the adults feed on maturing apples, eating small holes in the surfaces. Often these disfigurements render fruits worthless, which otherwise would pass as first class apples.

The prevention of these attacks is in a considerable measure a matter of orchard economy. Through care and attention to the early sprayings, much loss may be avoided. The cluster apple treatment two weeks after blossoming is often omitted, but is an important factor in curculio control. Late summer applications of lead arsenate, especially on the older trees, are suggested as a precautionary measure against the late feeding of the insects.

### Spraying Methods

This is a large subject and one which growers are apt to overlook. The increased cost of spray materials and spraying machinery has influenced, no doubt, the general attitude in this respect. Three points should be emphasized. These are the Time of application; Manner of application; Materials to use.

Time is the essential factor. Many failures in insect control are owing to the spray being applied at the wrong time to get the insects in their most vulnerable conditions. Oftentimes growers are puzzled to know when is the correct time to do the work. It is difficult for the average grower to judge whether it is necessary to make the usual number of sprays which are suggested. These are not recommended without a purpose and each has its place in the general scheme of orchard economy. As an aid to apple growers the College Entomologist and Pathologists have prepared a schedule which, if used, may be expected to afford the greatest measure of protection from insects as well as diseases.

# APPLE SPRAY SCHEDULE

Name	Time	Diseases and Insects Controlled	Material for 100 gal.
Delayed Dormant	When leaves of blossoms buds are out $\frac{1}{4}$ to $\frac{1}{2}$ inch.	San Jose, Oyster shell and Scurfy Scales, Rosy apple aphids, Bud moths, Leaf-rollers.	Lime-sulphur to test 1.03 Sp. G. Black Leaf 40 $\frac{3}{4}$ pt. Arsenate of lead powder 3 lbs.
Blossom Pink	When blossoms show pink. At separation of the cluster buds.	Apple scab. Bud moths, Leaf-rollers, Curculio.	Lime-sulphur to test 1.008 Sp. G. Arsenate of lead powder 3 lbs.
Petal Fall	When $\frac{2}{3}$ of the petals have fallen.	Apple scab, Codling moth, Red bug, Curculio, Frog eye, Leaf-spot.	Lime-sulphur to test 1.008 Sp. G. Arsenate of lead powder 3 lbs. Black Leaf 40 1 pt.
Cluster Apple	Two weeks later or when the young apples are the size of hazelnuts.	Apple blotch, Scab, Red bug, Caterpillars, Frog eye, Leaf-spot.	Repeat "Petal Fall" spray, or substitute Bordeaux 3-4-50 for Blotch.
Mid-summer	Late July or early in August.	Second brood codling moth, late bud moths, Apple scab, Apple blotch, Sooty fungus, Bitter rot.	Lime-sulphur to test 1.008 Sp. G. Arsenate of lead powder 3 lbs. Substitute Bordeaux for Blotch and Bitter rot.

**Manner**—Properly timed sprays are often said to be faulty. They are apt to give results in direct proportion to the manner in which the applications are made. Fruit growers have been taught that a mist-like spray is proper for making the usual applications in the spraying schedule. While such treatments with poison sprays are, when carefully made, quite efficient, it is often necessary to use coarser drenching sprays against insects as aphids and red-bugs. Insufficient quantities of spray are often a waste of materials, although in some instances failures to control an insect are due as much to lack of care in making the applications, as to inadequate amounts of material.

**Material**—Insecticides which have proven to be efficient killing agents and safe to foliage, are standard remedies. There are on the market various substitutes for these materials, which when used at proper dilutions are efficient, but more costly than the older remedies, or they may cause a greater or less amount of injury to leaves or fruits, if used indiscriminately. Cost is a large factor in these considerations and we have come to use materials which may be combined in two-in-one sprays, or three-in-one sprays. These practices enable treatments for more than one pest at a single operation and at the same time eliminate the cost of repeated sprayings. The benefits accruing from these combinations may depend largely on the kind of material used. Lime sulphur solution, arsenate of lead and nicotine have been used with considerable success for these purposes. For the present or at least until the differences in costs are lessened, fruit growers will do well not to greatly modify their practice in regard to these materials.

**Question:** Did you put nicotine in all sprays?

**Answer:** Lime sulphur and arsenate of lead were used, if conditions warranted we put it in. We advise putting in nicotine as many times as we can get the grower to use it. It is a good thing anyhow.

**Member:** It is too expensive to use in great quantities.

**Answer:** Well, use it whenever you can, as it is a great help.

**Prof. Hodgkiss:** It is not a question of how little you can spray. We do not talk so much about the "good fruit" we produce, but our idea is the time, manner and material. If you think of those three things, that is the secret of growing good fruit.

**Question:** Please tell us about dusting.

**Prof. Hodgkiss:** If you will be here tomorrow you will hear about that side of the question. Mr. Frost is going to say something on dusting that concerns his experiments, and perhaps at that time he may be able to elaborate on it and answer questions fully.



**Question:** How often do you spray in a year?

**Prof. Hodgkiss:** We have gotten to the point where we make 3-1 spray all through the season, whenever it is needed.

**Question:** What is the time for making dormant spray for Peach Leaf Curl?

**Prof. Hodgkiss:** Mr. Nixon will tell you about that tomorrow.

**Mr. Fenstermacher:** From the Professor's talk, it certainly looks as though there is "no easy road to success," and that "eternal vigilance is the price of success." In New York State they are putting concerted action into the dusting end of it. They have discontinued sprayers almost entirely, depending on the dust.

**Prof. W. A. McCubbin,** Deputy Director of Plant Industry, will now discuss "Peach Yellows."

### PEACH YELLOWS

By W. A. McCubbin,  
Deputy Director, Bureau of Plant Industry, Harrisburg, Pa.

This disease was the subject of some discussion at the meeting of 1919, but there did not seem to be as much interest in the subject as the disease seemed to us to warrant, consequently the Bureau of Plant Industry made plans to get such data on the disease as would convince the public that it was really a damaging and dangerous pest. During the summer of 1920 we conducted a somewhat limited survey of the peach orchards in several counties, but mainly in three, Lebanon, Cumberland and Lancaster, our intention being to find out the actual amount of Yellows in orchards in these counties, and what was being done to control the disease. In this survey, 104 orchards were covered in nine counties, involving 111,437 peach trees. Of these, 8,710 were definitely affected by Yellows (about 8%), and 5,277 were suspicious, a total of 13,987 or 12.5%. In other words, one tree in eight in these orchards was either diseased or suspected of the disease. The "Yellows" disease was found in plums in 179 trees. No percentage record of the disease in plums can be given.

Only 18 peach orchards were found in which Yellows was not present to a greater or less extent. The amount of disease in one orchard ran as high as 95%, and 6 of the orchards have about 75% of Yellows.

In translating these results into orchard conditions, it may be seen that they are not to be despised, since there are about 120 to 125 peach trees on an acre. The results in-

dicating that 12 or 14 peach trees per acre will be lost each year by Yellows. In money value such trees would be worth from \$75.00 to \$100.00 per acre. This is the average loss for these trees, and there is no doubt that similar loss is being sustained by other peach growing sections.

Moreover, Peach Yellows is a distinct factor in reducing the bearing life of our peach orchards, since it rapidly destroys a sufficient number of trees to make the orchard no longer profitable. If the present situation is not remedied, the outlook for the peach industry is gloomy, since the presence of so much Yellows has a tendency to discourage the planting of new orchards to replace those which are now rapidly going out.

Is it possible to control Yellows effectually? We feel that we can answer this question confidently in the affirmative, since it has been done before in a number of places; but in order to give the peach growers of Pennsylvania a reliable answer to this question, our Bureau sent out a questionnaire to all the eastern peach growing States. Among the questions that were asked was this very one. The answers were six in number; four stated that the method of control by early removal is successful; two announced that partial results had been obtained. We may, therefore, expect that concerted effort on the part of the fruit growers could readily banish the Peach Yellows from our orchards. There are difficulties, however, in the eradication of these trees. One of these difficulties is the recognition of early stages. Most people can tell the Yellows in advanced condition, but few are able to determine it surely when it first starts. The second difficulty is the negligence of certain members of a community who will carelessly or deliberately allow their trees to remain and to spread the disease both to their own and their neighbors' orchards. Foreseeing these difficulties, if eradication was to be left to the owners themselves, we included a question in our questionnaire on this point, and all the answers were emphatic in stating that dependence on individuals is useless, and that some sort of State supervision is necessary for success.

The Bureau of Plant Industry is prepared to use some sort of program of State inspection in Pennsylvania, recognizing that the seriousness of the Yellows disease makes such an inspection of the greatest value to the county. The Bureau feels, however, that in this case it would be useless to attempt Yellows eradication unless the fruit growers, or the majority of them, are favorable to the movement, and are willing to support it individually and collectively. We cannot proceed in the Yellows question as we have in the Potato Wart problem, where the necessities of the case have compelled us to quarantine rigidly without consulting the popular voice. In the Yellows question we prefer to proceed only when the fruit growing public demands our



action. For this reason I shall be glad to have this question thoroughly discussed at this meeting, and if the fruit growers are in favor of State inspection for Peach Yellows, and express that favorable attitude in the form of a Resolution or Motion of some sort, our Bureau will feel justified in taking the matter into further consideration. I would like, Mr. Chairman, to have as extensive an expression of opinion on this question, from those present, as is possible within the time limits.

**Mr. Bowers:** The old adage that "necessity is the mother of prevention" is very applicable in the case of Yellows. In 1905 the San Jose scale, as you all know, was sweeping over this State like a tidal wave, destroying everything in the fruit line. Then the people wanted help. The Legislature saw the necessity of it, and many of you know that the Legislature of 1905 passed a law that any tree, shrub, vine or bush, etc., found with San Jose scale should be treated or destroyed, and inspectors were sent out by the Bureau of Economic Zoology, now the Bureau of Plant Industry, that could tell the owner either to spray or destroy it by some method.

Now the Peach Yellows is a case where growers are a little lax in removing infected trees. A great many men are not able to detect Yellows, and a great many men do not want their trees taken out, but if they have "horse sense," as we say, they will see the advantage, and if a man is a law-abiding citizen he will want to do so, but a great deal of diplomacy must be used by inspectors. I believe that we, as an Association, can help the State in no better way than to get such legislation. In the case of San Jose scale, if a man did not remove or treat his trees, which were a source of spreading the pest, the State would send a man there to remove them, the costs of work becoming a lien on the man's property the same as other taxes. Once or twice only, that I know of, that was done—until every person became wise and sprayed. The inspection for Peach Yellows is the thing to do, and that is the way to get them to do it.

**D. M. Wertz:** I believe that a large number of us do not realize the importance of this subject. While we may think that the matter of removing a tree with Yellows is all right, we may also think that we may be able to get another year's benefit from it, and we do not have the "nerve" to remove the diseased tree in time. It seems that we have had several good illustrations in the past few years in enforcement of this kind. One of them is in the Department of Health and its difficulties in trying to safeguard our citizens in regard to quarantining homes for contagious diseases. Sometimes we think that its methods are carried to a great extreme when our homes are quarantined for various diseases; but it is a good thing, and we are flourish-

ing under that severe quarantine law, and I question whether or not the same thing could not and should not be applied to this unknown disease of the Peach Yellows. Our scientific friends can tell us when the disease is present in the very first stages, and if it passes to the second stage, if left alone, then it is better to know it at once, and I think the strong arm of the law should force us to remove infected trees. It should be done in a systematic manner, and I, therefore, wish to present the following Resolution, which I will read. I believe it should be adopted by this Association.

**RESOLVED,** That in view of the increasing prevalence of Peach Yellows and Little Peach in the important fruit growing areas of the State, and recognizing the virtual impossibility of controlling these diseases without some sort of State inspection, the State Horticultural Association urges the Department of Agriculture to establish an efficient inspection service for these diseases, and pledges its support for a program which will lead to their control; and further urges that if existing legislation is not sufficient for the purpose, additional legislation be provided, together with an adequate appropriation for the effective carrying out of this work.

**Mr. Fenstermacher:** You have heard the Resolution read, does anyone move its adoption?  
It was moved and seconded.

**Mr. Wertz:** I would be glad to have the general body of this Association think of, and consider this Resolution. I believe it will be well to have it acted upon by the members themselves, rather than have it referred to the Committee on Resolutions.

**Mr. Lewis:** I have seen a whole orchard wiped out by this disease. At first, only a few trees in the orchard had the Yellows, and later in the season every tree was diseased. I tried hard to get them to take out the diseased trees at once. I failed, and they lost their trees. So far as I am concerned, I feel that if we had legislation to compel others to remove such diseased trees, we would not be obliged to remove any trees in the course of a few years, and all of us would be benefitted.

**Mr. Horst:** I think we ought to include in this Resolution that the Department of Agriculture be required to compel the nurserymen to use stock that is free from Yellows. Should Yellows show plainly on nursery stock, the nurserymen should be held responsible. Some of them do not seem to care where they get their stock, and they should be compelled by the Department to get clean stock on which to grow their trees. We cannot keep our orchards clean if we are continually buying infected stock.



**Mr. Fenstermacher:** Won't Mr. Wickersham defend himself on this subject?

**Mr. Wickersham:** I really do not know much about that subject, but I have seen peach growers who thought they knew a great deal about it. They would try to teach nurserymen how to grow trees, and they have generally made great failures of it. I have always tried to grow trees from healthy seeds and healthy buds, on ground that was not surrounded by Yellows. I think that is as far as the nurseryman can go for the sake of the fruit growers. I have not always succeeded in growing trees that did not get Yellows, and I have not contended that I could do it. There is not a man here who can say he is immune from smallpox, and neither can we grow a tree that will not get Yellows.

**Mr. Horst:** My idea is that the nurserymen should be helped to buy stock that is clean. I do not mean to antagonize them.

**Mr. Bowers:** I think the fellow who should not be patronized is the agent who goes through the country and sells what nurserymen have cast aside to be burned. In some cases the nurserymen have arranged to burn the poor stock, but the agent comes along and buys the stuff, and sells it to the farmers. That is the fellow we should get after.

**Dr. Orton:** There is no question but that the Peach Yellows is one of the most important diseases that the peach grower has to deal with. I have watched it since I have been here in this State for eight years, and it is increasing, and has been increasing rapidly in that time, and something must be done. I am not in a position to recommend what should be done, but I know that we have got to do something, and the sooner we get after it, the sooner will we get results.

A motion was made to pass the Resolution, which was unanimously passed by the Association.

Wednesday Afternoon, January 26, 1921.

The meeting was called to order by the President, when the business of the Association was taken up.

The question was discussed as to whether members, who are not paid-up members of the Association, should be admitted to the meetings.

**Mr. Breidenbaugh:** I think it is the idea of the people that the proceedings of all the Associations listed in the program are free to the public, and the people believing that the State is responsible for the meetings feel, therefore, that there should be no charges, due or assessments. I see listed in this program many other organizations. What do they do about this? Do the Beekeepers admit only

members to their meetings? Whether they do or do not, I feel that our proceedings have been too free in the past. The man who does not put money in a thing does not take the same interest in it as does the man who puts money into it. I would say that if we had done years ago what we are aiming to do now, we would not have to discuss any such needs of the Association, and we would not have had this trouble, if it had not been left with individual members as a matter of honor to pay dues. I am heartily in sympathy with raising the dues, if it is necessary, and although I have a life membership, I would be in favor of asking some kind of a levy from the life members, if we need it. We must go forward, and that is the only way.

Mr. Starkey suggested that dues be increased to five dollars a year.

**Mr. Chase:** Under the constitution a proposition of that kind would have to be submitted in writing and go into consideration at the next meeting.

The Secretary was then asked to read Article 7 of the Constitution to the members. This article provides that a proposed amendment of the Constitution must be submitted to the Secretary at least sixty days prior to the time of the Annual meeting.

**Mr. Lewis:** I put in the form of a motion that Mr. Starkey's suggestion be put in writing, and carried over to next meeting, namely, That the dues be increased to \$5 per year and that we admit only members to the meetings. This motion was seconded.

## FUTURE POLICY OF THE SOCIETY

S. W. Fletcher, State College, Pa.

The State Horticultural Association of Pennsylvania has had a long and honorable history. It has been one of the most potent factors in developing the horticulture of the State. None of us, however, feel that the society is fully accomplishing the work for which it was created. We are handicapped by lack of funds. Although the Association is out of debt, thanks to the heroic efforts of a few loyal members two years ago, no proceedings have been published for three years. It is manifestly impossible to maintain the interest of members who are not able to come to the annual meetings, unless annual proceedings are published regularly.

The big problem of the Association, as I see it, is that of finances. I again raise the question of State support for the Association. A large part of the success of the State Horticultural Societies of New Jersey, Virginia and other neighboring States is due to the appropriation which they



receive from the State. Personally, I am strongly in favor of a limited State appropriation for this Society. It is justified for exactly the same reasons that warrant the expenditure of State money for farmers' institutes and county fairs. It is not class legislation in a narrow sense, for it is in the interest of the public welfare that the agricultural and horticultural resources of the State be developed as rapidly and as fully as possible. I have had an opportunity to observe the working out of the policy of State aid for horticultural societies in several States always the benefits have far outweighed the disadvantages. I am convinced that an appropriation to the State Horticultural Association of Pennsylvania of \$5,000 a year, which is the amount that the Virginia society receives from its Legislature, would do more to promote the horticultural development of the State than an appropriation of several times that amount to any other agency. Among other things, it would permit the employment of a paid secretary through whom the society would function throughout the year, not simply at the annual meetings. I should like to see the Association reopen this question with the Secretary of Agriculture.

If we are to be dependent wholly upon membership dues, as at present, the income must be much larger than it is now. The State Horticultural Society of New York has no State support but it has an annual income of about \$5,000 a year. Last year the commercial supply exhibit at the annual meeting netted the society over \$1,000. I raise the question whether the State Horticultural Association of Pennsylvania is not entitled to some income from the Farm Products Show. However that may be, it is evident that most of our income must come from membership dues.

We should have a membership of several thousand rather than several hundred. The horticultural interests of Pennsylvania are large and are expanding rapidly. Within fifteen years, I believe, we shall be a close rival of New York for first place in the horticulture of the East. There are enough people in Pennsylvania who are interested in horticulture to make a membership of 2,000 not at all unreasonable, but we shall not be able to secure it under the present type of organization. It will be increasingly difficult to maintain a strong State society in Pennsylvania, because our horticulture is so localized. Three-fourths of our fruit growing and practically all of our vegetable growing is retail; the products are grown for local markets, not for shipment to wholesale markets. This means that our growers do not have so many interests and problems in common as the growers in great wholesale districts like western New York or Virginia. Hence, the tendency has been and is still for local, county, or district societies to develop at the expense of a strong State organization. This

is a mistake; both are needed, the county society for the discussion of local problems of culture and marketing, the State society for the consideration of matters of general interest, such as State and Federal Legislation affecting the fruit grower and gardener. They should be not competitive, but complementary. I think that the State society should ask the various local, county and district societies to affiliate with it on the following basis:—Members of a local, county, or district society shall be members of the State society as well, when \$1 a year is sent to the State society for each member. The State society shall send each member a copy of the annual proceedings, in which shall be included brief reports of the meetings of the local societies, which are forwarded by their secretaries. This plan of affiliation was endorsed at the last meeting of this Association and, in accordance with the rules, will come up for final action at this meeting. If it should commend itself to local societies generally, ultimately the State association will have a membership of several thousand and then will be in a position, as it is not now, to speak authoritatively for the horticulture of the State in regard to legislation, and other matters of general interest.

A proposition quite the reverse of this has been advanced by some. It is that the membership fee of this Association be increased to \$10 or more a year and that a well paid secretary or manager be employed to look after the business interests of the members, such as the purchasing of supplies and the sale of products. This would make the Association, in effect, a co-operative society. Heretofore, it has been a strictly educational organization. Is it wise to change? The experience of other State societies has been that the more closely they adhere to an educational program the better. This was the decision of the New York and Virginia State societies at their recent meetings. The business side of horticulture should be completely segregated from the educational program. It should be taken care of by other organizations, created for that special purpose. A State horticultural society should exist for the benefit of all the growers of the State, not a few. It should be at the service of the man with only an acre or two, as well as the large wholesale grower. Under no other conditions could State support be justified. For these reasons, I feel that the membership fee should be kept low and that no attempt should be made by the Association to do business for its members except, possibly, to supply timely information on cost of spray material, packages, etc. The business side of horticulture should be handled by local commodity co-operative societies.

In brief, I suggest:—

- (1) That the Executive Committee be requested to



take up with the Secretary of Agriculture and the Legislature the question of a State appropriation to the Association.

(2) That the membership fee remain \$2, except for members of affiliated local, county, or district societies.

(3) That article two of the Constitution be amended by adding the following:—"Members of local, county, or district horticultural societies are eligible to membership in this Association under the following conditions:

1. The local, county, or district society shall have a bona fide paid membership of not less than twenty-five and shall hold at least one stated meeting a year.

2. The secretary of the local, county, or district society shall certify to the secretary of the State Association not later than January 31 of each year, a list of the paid members of the society and shall send \$1 for each member so certified, which shall be their annual dues in the State Horticultural Association.

3. The State Horticultural Association shall include in its annual proceedings such reports of the meetings of local, county, or district societies as may be forwarded by the secretaries of these societies."

**Member:** I move that Article 2 of the Constitution be amended as suggested by Dr. S. W. Fletcher, as follows:

"That the Constitution of the Association be amended so as to provide for the affiliation of County or Local Horticultural Societies with the State Horticultural Association, as follows:

Members of County or Local Horticultural Societies shall be granted membership in the State Association under the following conditions:

1. The County, Local or District Society shall have at least twenty-five paid up members, and shall hold at least one meeting a year.

2. The Secretary of the County, Local, or District Society shall remit to the Secretary of the State Association annually one dollar for each member before January 31st, of each year, which shall be their dues in the State Association for the year.

3. The Secretary of the County or Local Society shall transmit to the Secretary of the State Association annually a list of its officers and members, together with a brief report of its work, particularly of those matters that are of general interest to the horticulturists of the State. The State Horticultural Association shall publish these reports in its Proceedings which shall be distributed to the membership of those county or local societies that have complied with these provisions."

The motion was passed by the Association, and the Secretary was directed to record it in the minutes.

**Mr. Fenstermacher:** Are there any further remarks in regard to amending the By-laws?

**Dr. Fletcher:** I think this will certainly give more money. There are seven or eight societies. If their interest can be enlisted, our membership should certainly go up within a year or two. Not knowing whether this motion would be adopted, it was suggested to the members of the Lancaster County Association, one of the strongest societies, and they approved of it. They have a membership of around seventy-five, and with that as a starter, I think we can put this over.

**Mr. Fenstermacher:** What have the Adams County people to say?

**Mr. Tyson:** It has not been considered at all.

**Mr. Fenstermacher:** How does it strike you?

**Mr. Tyson:** It would mean that in order to carry on the local Association that the dues would be at least two dollars, and they would each have to settle that, but I myself think well of the plan, and I am not at all sure just how much more in membership it might give us than some other plan. At any rate it would be worth a lot to the State Association to be tied up with the County Associations. Of course, to a considerable extent we might expect that most of our members here are members of some local association. I think well of the plan and can see its advantages.

**Question:** Might it not be well to ask the members of this Association who are present, whether they are members of County Associations? It seems to me that members active in local gardening associations at least are members of our Vegetable Association of the State, so as far as the Vegetable Growers are concerned, it would be no advantage to you in membership.

**Dr. Fletcher:** The point is that we have to have the support of all parts of the State, and horticulture is so localized that the people in Wyoming County, for instance, are going to organize a society and never come down here, the same is true around Beaver County. If we want those people tied up with this Society the only way I see is by some such move.

**Mr. Fenstermacher:** We used to interest the local societies by having the meetings held all over the State.

**Mr. Bowers:** It seems that it is a question of finance as to whether this Association is to thrive or not. Since the Association is in need of members from all parts of the State, why not ask for an appropriation. This State is appropriating funds for many purposes, not any more important than this one, and I think an appropriation could be



secured, and then we should make these meetings so interesting that the men will come. Also, there is another subject; I know there are quite a few men come whose time is limited, and this morning the meeting was set for 9:00, and it began thirty minutes behind schedule. The same was true of this afternoon's meeting. If we say 1:30, make it 1:30, and then make these meetings so very interesting that the people will come. The Lancaster County people make their meetings so interesting that the people do come out.

**Question:** Do I understand that the local associations are to contribute toward this Association one dollar per member per year? Belonging to this Association costs me two dollars, plus one dollar for the local association.

**Answer:** The dollar sent in by that Local Society pays your dues to the State Association.

**Mr. Chase:** I move the adoption of Amendment to By-Laws as proposed by Dr. Fletcher. The motion was seconded.

**Mr. Fenstermacher:** All in favor of the motion to make it a part of the Constitution will please rise.

The motion was passed unanimously, and the Secretary was instructed to send a copy of this motion to the County Societies.

**Mr. Fenstermacher:** We will now have the Treasurers Report.

## THE TREASURER'S REPORT

### RECEIPTS

Cash balance 1-21-20 .....	\$334.00
3-16-1920—From Interest on \$100 Liberty Bond .....	2.12
3-19-1920—From H. F. Hershey, 118 Annual dues .....	236.00
3-19-1920—From H. F. Hershey, Donation by D. M. Wertz ..	12.50
3-19-1920—From H. F. Hershey, Sale of Fruit .....	69.65
1-22-1921—From H. A. Shantz, Membership Secretary ....	206.00
1-22-1921—From H. F. Hershey, 7 Annual dues .....	14.00
1-24-1921—From Interest on Life-Membership Fund .....	5.02
12-10-1920—From John Bacon, Annual dues .....	2.00
9-16-1920—From Interest on \$100 Liberty Bond .....	2.13
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	\$883.42

### DISBURSEMENTS

3-19-1920—To Torsch & Franz Badge Co. ....	\$ 6.05
1-20-1921—To H. A. Schantz, Postage .....	30.00
1-20-1921—H. Ray Haas & Co .....	44.50
1-21-1921—To H. F. Hershey, Expenses .....	153.98
1-21-1921—To The Gettysburg Compiler .....	25.50
1-21-1921—To Torsch & Franz Badge Co. ....	14.73
1-26-1921—To Cash on Hand .....	608.66
	<hr/>
	\$883.42
1-20-1921—To H. S. Schantz, Postage .....	30.00

## WE RECOMMEND OUR ADVERTISERS

## AUDITORS' REPORT

The Report of the Auditing Committee was now submitted by Mr. Bowers:

"We, the undersigned Auditors, have examined the accounts, bills and vouchers of the Treasurer Edwin W. Thomas, and find the same correct, showing the receipts to be \$883.42, and the disbursements \$274.76, leaving a balance of \$608.66.

Respectfully submitted,

E. C. BOWERS,

JACOB L. REIFE,

Auditors."

## THE REPORT OF THE NOMINATING COMMITTEE

The Report of the Nominating Committee was next submitted as follows:

The Committee presents the name of our present President, Mr. P. S. Fenstermacher, for President; Mr. C. A. Griest for First Vice President; Mr. Howard Anderson, Second Vice President; Mr. G. E. Smith, Third Vice President; Mr. H. F. Hershey, Secretary; and Mr. Edwin W. Thomas, Treasurer.

Submitted by Nominating Committee composed of

ROBERT LOVETT,

D. MAURICE WERTZ,

H. C. BRINTON.

Mr. Tyson moved the approval of the nominations, and the Secretary was instructed to cast the ballot, and the officers named were elected by announcement of the Secretary.

**Mr. Fenstermacher:** Members of the Association, I appreciate the honor you have shown me in re-electing me. I did not expect to serve another year for two reasons; one is, I am a pretty busy man,—in fact, I have more to do than I really want to do half the time, and, next, I think the honor should go around, be spread around as much as possible. I am reluctant to accept. However, if it is your choice, and I accept, what co-operation are you going to give me this coming year? How will you help to increase the membership? How many are going to get a new member? I will accept this office provided you each promise to do what you can. All those willing to do that, will please rise. The majority seem to be in favor of helping. Now see that you do.

We have been going along in a half-hearted manner for a number of years, and it sort of palls one to be connected with something of this kind, giving what time you have to



spare and getting no results. I am a great man to want to get results. I am in favor of quitting this thing altogether or getting results. We should have at least two thousand members. It is going to be a big thing in a few years. We can grow anything that is adapted to this latitude, and we want to make this Association worth while. I thank you again, and I hope you will do your best, and I will also, so that this Association will not be one of the lowest in numbers, but at the very top notch.

I would now like to introduce the next speaker, whom, I am certain scarcely needs any introduction, Dr. U. P. Hedrick, of the Geneva Experiment Station, Geneva, N. Y.

### BREEDING FRUITS

By Dr. U. P. Hedrick, Geneva, N. Y.

Plant-breeding at the New York Agricultural Experiment Station began some thirty years ago. Fifteen years ago the work came into the hands of the speaker and he roughly outlined the work in the Station looking to the improvement of fruits under several heads. Plant-breeding requires time, trained help, experience and money; since equipment and material do not create, it also requires ideas. Lacking some of these factors entirely and falling short considerably, in most of the others, not as much progress has been made as could be wished, yet something has been done with all of the experiments started and with some a mass of data has been collected, which promises rewards when it can be worked up. The experiments now have to do with the breeding of all tree fruits, grapes, red and black raspberries, strawberries, blackberries, currants and gooseberries. The writer has in mind for this brief paper an account of experiments under way.

A study of correlations in characters of plants heads the list of experiments. The importance of correlations of the characters of plants, from the standpoint of either breeding or practice, is too well known to need setting forth. In particular, the greater the knowledge of correlation, the better the fortification for the attack on plant-breeding problems. By correlation is meant the connections between parts or functions of plants. Such connections are not common phenomena and the seeker is so seldom rewarded that you will not be surprised at the few which from our several years search, we are able to name.

Before the work of plant-breeding came in the hands of the writer it had been found that size, weight and specific gravity of the seeds of some plants were correlated with germination and vigor of the seedling. Later, we found that grapes with long internodes, give long, scraggly bunches and we therefore discard all seedlings with very long in-

ternodes. So, too, a seedling with a very short internode is discarded because it gives a short-clustered bunch. Very generally, but with many exceptions, the foxy taste and aroma of grapes is associated with the color of the skin. Thus, white grapes usually have a pure flavor; other colored grapes, especially those with black and red fruits, more often have a foxy flavor. Reflexed stamens are correlated with self-sterility; upright stamens with self-fertility. Slenderness of stalk or twig and smallness, thinness and imperfectness of leaf in seedlings nearly always portend lack of vigor in vine, bush or tree fruits. Thorniness in pears and apples is usually associated with an inferior fruit. These are but a few of many indications used in discarding seedling plants.

One of the most striking correlations found is in the peach. In some of the blossoms of this fruit the color of the inner surface of the calyx-cup is green. In other varieties the cellular tissue of the inner part of the cup is deep orange in color. Upon investigation it is found that the flowers having the cups green inside are those of the white-fleshed varieties while the blossoms with the orange cup are those of the yellow-fleshed sorts.

Investigations of the laws of inheritance in fruits is the title of another problem projected. As examples of what has been learned in this field the following may be given: From data now at hand, we know how a number of characters of grapes are inherited. To illustrate: The seedlings of black grapes may be black, white and red; of red, red and white, but the seedlings of white grapes are always white. From a study of nearly seven hundred seedlings we find that crosses of grapes with large berries have given as a progeny nearly thirty per cent of which have large berries; while parents whose size of berry is only slightly above medium gave us only four per cent large; and in the few cases in which we have crossed varieties, whose size is below medium, we have never had a single seedling with large size berries.

A study of the inheritance of upright or reflexed stamens in grapes is interesting for the reason that grapes possessing reflexed stamens are self-sterile and so require inter-planting with other varieties. Four hundred crosses of reflex stamens crossed with upright give us practically equal proportions of these two classes, while crosses of reflex crossed with reflex, out of a small number of seedlings, give us more nearly two reflex stamens to one upright. When we come to study the 230 seedlings, whose parents on both sides have upright stamens, our expectations are not realized for nearly one quarter have reflexed stamens. Certain varieties, however, seem to be pure for uprightness, and the problem on which we are now working is



to find why there is this difference. The possibility of eliminating sterile varieties in future breeding seems bright.

In work with the apple, the results of which have been published, inheritance of skin color, flesh color, size and shape, acidity and sweetness, and of ripening period, are given. With strawberries, we find that when imperfect varieties have been pollinated by perfect sorts, the resulting seedlings are of the two types in practically a one to one ratio. The results secured when two perfect sorts have been crossed are: 2190 perfect, nine semi-perfect, five imperfect. The five imperfects may be regarded either as representing errors in observation or as being the product of abnormal perfects. The seedlings secured by self-pollinating perfect varieties, differed materially from those from cross-pollinated perfects. There were 3159 perfect, 685 semi-perfect and 474 imperfect. (All of the imperfects were secured from eight perfect varieties.)

A third experiment calls for a test of all varieties of fruits that will thrive in New York. To this end the Station is now testing about 2500 named varieties of American and foreign fruits. We regard this as valuable work. It is yielding important results and promises greater results for the future to fruit-grower and breeder alike. Moreover, we must have a variety collection to furnish material with which to breed and to keep before us concrete ideals in breeding work.

The varieties, too, on our grounds, enable us to publish a series of books on fruits, which, when completed, we hope will contain much of value for those engaged in plant-breeding. There is no question but that under the ferment of new ideas we are at the beginning of a new era of great improvement in fruits. There never have been well-directed efforts to improve fruits, yet something has been done with all. Now when there is an onrush of new discoveries in plant-breeding it seems to be a particularly opportune time to tell all that can be learned about how fruits have been bred from the wild state to their present perfection. This we try to do in the fruit books in giving the origin and heredity of varieties, especially as to parentage and manner of origin.

At the beginning of our work we started a collection of all the wild species from which tree, vine and bush fruits have descended. We still look upon this as about the most important project in hand but lack of land and lack of time have prevented the formation of anything like the kind of an arboretum we want. This leads me to say that before we can do much in breeding fruits or agricultural plants of any kind we must have an orchard in which may be found the wild fruits of the world suitable to the region.

In several projects we are attempting to develop hardy plants. The peach and European grapes are the special objects of experimentation. Considerable preliminary work has been done in the study of the factors which influence hardiness of the peach. A plantation of all available peaches, apricots and nectarines, numbering about 450 varieties, was set out for experimental and breeding purposes and the study of hardiness is one of the chief uses of the plantation. We are growing, too, about one hundred varieties of European grapes among which are the hardiest sorts obtainable. (This matter of hardiness we find to be a most complex subject and we have to push toward the goal not by direct line but by by-ways and often back-ways and continually run into blind alleys.) We long since came to the conclusion that we could get forward in this matter only by hybridizing, but even so there is much to check progress. The discovery of new and hardier species of practically all fruits in foreign countries promises to furnish much valuable material for hybridization.

Some attention is being given to the development of the resistance of disease in practically all the plants we are now breeding. Immunity to contagious diseases, or the fact that some animals and plants are more or less secure against infectious germs to which near of kin are subject is elementary knowledge alike to those who have charge of the health of humans or of the lower forms of life. In spite of the wealth of recent discoveries the cause and conditions of immunity are not well known. With plants, especially, knowledge of immunity is a thing of shreds and patches. But while we are in comparative ignorance of how immunity is transmitted in plants, we now have a substantial body of facts showing that it can be bred in plants. As far back as 1900, the breeding of disease resistant plants had been begun and has been steadily carried on since through crossing.

Meanwhile, not much real building can be done until we have the foundation laid and that foundation must be knowledge of immunities and susceptibilities of existing varieties. At Geneva we have been taking notes for a number of years as to the relative resistance of varieties of the fruits we are growing to several diseases, chief of which are: apple scab, apple blight, curl-leaf, curl-leaf of peaches, brown-rot of peaches, cherries and plums, black-knot of the plum and pear blight. We are growing about 2000 seedling pears from parents more or less immune to pear blight with the hope of getting a variety immune to this disease. We have, too, a considerable number of goose-berries, crosses between American and English sorts, with the hope of getting a variety of the English gooseberry comparatively free from mildew.

It is certain that bringing forth new sorts of fruits



immune to this or that disease is a distinctly forward movement in horticulture and that success in this work will again justify the time-honored saying, "An ounce of prevention is worth a pound of cure." Yet it must be a long drawn-out process and we are not hoping for very immediate results. It will be remembered that Pasteur made the confident assertion toward the end of his life, "It is in the power of man to make all parasitic diseases disappear from the world." The immunizing treatment of animal life against diseases bids fair to fulfill Pasteur's prophecy but we can hardly hope for immunizing treatments with plants and must look to plant-breeding as the chief means of causing parasitic diseases to disappear.

In all the experiments in breeding an attempt is being made to discover what varieties of the several fruits are most suitable to breed from for the various purposes. Possibly the most valuable result so far is the knowledge we have obtained of varieties of plants preeminently suited to our purposes. We feel that we have already found a number of plant geniuses in breeding work, many of them worthless for commercial purposes, upon which we can depend to obtain certain characters in the offspring. With some groups of plants at least we are thus at the point where we can begin real work. On the other hand, in some of our problems we know that we must continue the search for parents that contain the characters we want. To illustrate: the Concord, Delaware, Niagara, the three leading grapes in New York of which we have grown a thousand or more seedlings, are wholly unsatisfactory for breeding purposes. On the other hand, Governor Ross, Mills, Winchell and Diamond, as examples, sorts of which one seldom hears, may be depended upon to give certain characters which they possess to their offspring. The President, Marshall and Sample strawberries are Shakespeares in this fruit. Among the numerous varieties of red raspberries with which we have worked, Marlboro and Superlative alone have given us offspring worth while.

There are now several hundred promising seedlings of various fruits selected out of as many thousands, to be distributed generally in the State for further testing. It is interesting to note that not one of these is a pure bred seedling. The progeny of selected plants in our work, so far as the value of the offspring for commercial purposes is concerned, are almost worthless. Pure bred plants are so lacking in vigor that one may almost make the sweeping generalization that they are worthless in the improvement of varieties. Quite contrary to the old notions of such seedlings we find that they very generally resemble the parent closely enough so that even a tyro can tell from whence they came—there are but few cases in which they revert to the wild proto-type.

It would require a long volume to set forth the factors that govern the choice of parents in cross breeding; yet all are set forth in every cross we make on our grounds. Two general ends are in mind with most of the fruits; first, we cross this or that species of a variety to help establish some principle. Second, we combine the characters of species or varieties in the hope of getting an offspring with the good characters of the two parents minus the poor characters. In either case the rouge of speculation quickens the charm of the work. We never can tell just what we shall get.

The last of the experiments to be mentioned, and possibly the one to which we have given most time and attention, is the improvement of varieties by bud selection. It is held that the variations found in the varieties of fruit can be reproduced by taking buds from plants possessing the variations. Nurserymen put this theory in practice and offer plants with a "pedigree" to show that they come from good ancestry.

We have gone at this problem in several ways. First, we have studied the histories of apples, grapes, plums, peaches and cherries as set forth in the fruit books we have published or are publishing, to find out how many sorts have come into existence through bud mutations, and to see if they have been the least improved by continuous selection throughout their existence or to see if any have degenerated. A few sorts have originated as bud sports or mutations—possibly one out of a thousand, but we have found no evidence to show that any fruit has been changed in the least by continuous bud selection or that any has degenerated.

The use of the term "pedigree" by nurserymen has made it desirable to hasten these experiments in bud selection. For this reason it was decided to work with some plant where a generation could be secured more rapidly than with the apple. The double violet offers desirable material and it was decided that the length of the blossom stem was the simplest character to use. In the autumn of 1914 eight hundred Marie Louise plants were grown and the work of selection begun. Data for five years' work does not show positively that the length of the flower stem can be increased or diminished, though many interesting things have come out of the experiment which is only as yet well begun.

There are from fifteen to twenty thousand distinct varieties of fruits on our grounds, counting seedlings. The men in the department are instructed to search for sports or bud mutations. Occasionally we find one that reproduces itself but they are rare. In one project now under way we are growing all the supposed strains of the Baldwin apple and trees of the Baldwin apple bought from nurseries



in all parts of the United States with the idea of seeing whether the resulting trees and fruits will be identical with the New York Baldwin or whether each supposed strain or local variation will be reproduced. In another experiment we have propagated a considerable number of apples from scions taken from the best trees in a Rome Beauty orchard and the poorest trees in the same orchard.

None of these experiments having to do with bud selection are finished but we have gone far enough to satisfy ourselves that through seeds, and seeds only, can the plant-breeder find means for improving fruits. Yet, we are open minded in this matter and will welcome most warmly any critical evidence that may be produced to show that bud selection can be used in improving plants.

It may be interesting to note in conclusion that incidental to these experiments the Station has distributed twelve new strawberries and six raspberries which are making their way in the small fruit industry of New York, a dozen new varieties of apples, six grapes have been named and distributed and we are propagating about sixty more of these desirable grape seedlings, some of which have been distributed, and all of which we hope to have grape growers test within the next few years. All told, we have grown about 20,000 seedling fruits under breeding numbers, about 12,000 of which have fruited. At least 10,000 fell by the wayside before the mid-wives could even christen them with a number. Possibly there are six or eight thousand more now in the nurseries.

More might be said of the work at the Station if time permitted and if it were worth while. (I have left many things unsaid because to formulate them into statements might expose my ignorance of the whole subject of plant-breeding.) If I were asked from my experience to give helpful advice to others the chief item would be, "Do not attempt so much." I sometimes fear that our work at Geneva is "like a circle in the water which never ceases to enlarge itself till by broad spreading it disperses to naught." We are attempting too much. Yet those of us who have had a hand in the work have the comfortable feeling of Longfellow's Village Blacksmith:

"Something attempted; something done,  
Has earned a night's repose."

**Mr. Brinton:** Do I understand that contrary to all that has been advertised on pedigreed trees you have not found any advantage in bud selections?

**Dr. Hedrick:** We have not found any advantage, and we have worked with system on the bud selection. I understand that they can improve citrus fruit by bud selection,

but they are very different from our fruits of the eastern states.

**Mr. Brinton:** Have you found anything that will cause you to reach a conclusion as to why a given tree out of the same lot and variety does so much better than the rest of the trees in that lot under similar conditions?

**Dr. Hedrick:** Yes, indeed, the bit of soil in which it stands may be the cause. We find all sorts of conditions from the most uniform piece of ground. Also, soil causes a great deal of variation. Then there is another sort of variation that must always be kept in mind. All our deciduous trees are worked on seedling stock. If you are going to pedigree the top you must pedigree the root as well. In fact, I think a pedigreed root is better than a top. You must know where roots come from as well. We feel that this work on pedigreed trees has been of immediate practical benefit to our fruit growers of New York. There was a time when the growers were inclined to prefer pedigreed trees, and the experiments at Geneva have kept some at least from going into this pedigreed nursery stock work.

**Dr. Fletcher:** What are the prospects of developing a method by which we can get nursery trees that are on their own roots from cuttings instead of seedling roots?

**Dr. Hedrick:** You can get nursery trees on a root that come from a cutting, but the investigations are not very promising. There are no standard apples. There are dwarf apples which may be propagated from scions or cuttings, but no standards. If someone can discover such a cutting, then we will do away with seedling stock, but no one has as yet done it. It is not out of the line of probability. It is to be greatly desired. If someone can discover how to propagate this fruit, we will surely get rid of a great deal of trouble that we are now having, and it will also overcome much trouble we have had.

**Mr. Tyson:** Is there any likelihood of getting apple scions to root?

**Dr. Hedrick:** I think they are not true roots, and thus they will not grow. The scions of the apple will not root.

**Mr. Tyson:** I want to go back to Doctor Fletcher's talk. I would be a little sorry not to see Doctor Fletcher's suggestion of asking for State appropriation developed. In past years we have had State appropriations. We have felt that they were not as extensive as they could be, but when we received any help, the help with our meetings, and the little help with our publications, was just so much to the good, and we were able to offer some aid to our members, and make the meetings so much more worth while, and it was certainly a little easier to have members under those conditions—with the publications and prizes, and I should like



to see a consideration to ask for some appropriation of that kind, but one trouble that is likely to arise is the fact that not only the State Horticultural Association, but others of some ten or a dozen associations will feel likewise that they should have assistance. However, I do not know whether we need to take that fact into consideration or not.

**Mr. Fenstermacher:** This is not a new question. Years back we have had committees appointed for this purpose, and I remember that Hon. Gabriel Hiester, one of the finest men I ever knew, said to me, "Never again will I go before an Appropriation Committee to ask for aid, and be made a monkey of." They made fun of it, and so we simply "cut it out," and decided that we would try to paddle our own canoe. Another reason was that it was "class legislation" that would open the door for lots of other things.

If you will make a motion for the appointment of a committee I will be glad to do so, however.

**Dr. Fletcher:** I feel that the very least that we could expect would be the publication of our proceedings, and I feel that if the society feels that the time is expedient, it would be well to recommend that we place the matter before the Secretary of Agriculture, and I believe that he would see that it would be wise and desirable to publish the proceedings out of his appropriations if the enactment of his Department might be so arranged as to permit it. This would take aside certain objections.

**Mr. Chase:** I thoroughly agree with Doctor Fletcher and Mr. Tyson. It would be a mistake to ask for direct appropriation, but we could get something through the Department of Agriculture that would be of help, I believe, and this would be the best plan.

**Mr. Brinton:** I think what has been suggested here has been along the line of what we have been needing for quite some time, and we do bump into such things when we go as an organization asking for an appropriation, and as Doctor Fletcher was talking I was wondering if it would not be a good plan to appoint a Committee, with Doctor Fletcher as Chairman, and let them handle the thing, and get it through. I think it very likely that we can get those proceedings published. It will be a great help to us, and probably would go farther than an appropriation would. It would come up from time to time with a change of administration.

The above suggestion was made in the form of a motion and seconded.

**Mr. Tyson:** If the proceedings are published by the State Department of Agriculture we can not restrict the distribution to our own members. It would be the same thing so far as results are concerned. They would go to every-

one. I would suggest, that if the movers of that motion are willing, that the committee be instructed to ask for aid rather than for the definite matter of printing of the proceedings.

**Mr. Engle:** If you want those reports out promptly, I would suggest that you do it yourself, because if printed by the State you won't get them for years. By the time they are ready for distribution nobody wants them. If you can get an appropriation for the use of the Society—to be expended as it chooses and suits, it would be best. Keep away, I say, from having the proceedings published by the State.

The following committee was appointed to see the Secretary of Agriculture in regard to the matter of appropriation:

Dr. S. W. FLETCHER,  
Chairman.

Mr. C. J. TYSON.  
Mr. H. C. BRINTON.

**The Motion:** Resolved, that the Chairman appoint a committee of three to confer with the Secretary of Agriculture in regard to securing an appropriation from him for the support of the State Horticultural Association.

The motion was duly presented and passed by the Association.

The meeting then adjourned on motion until Thursday morning at 9:30 A. M.

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**Thursday Morning, January 27, 1921.**

The meeting was called to order by President Fenstermacher, who then introduced Mr. S. L. Frost of the Arendtsville Field Station.

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#### INSECT INVESTIGATIONS

By S. W. Frost, Arendtsville, Pennsylvania Laboratory  
of the Pennsylvania State College, Pa.

You are no doubt aware that the Pennsylvania State College has, for over two years, maintained three permanent Research Laboratories within the State. One of these is located in Erie County, a second in Philadelphia County and a third, where I am stationed, in Adams County. These laboratories have opened new channels for investigation and have made a type of work possible which can be carried on by no other department or organization connected with State College. The permanency and location of these Laboratories in the centers of Fruit and Vegetable sections of



the State afford opportunities which can be carried on only by trained men, who are constantly in touch with field and orchard conditions. The advantage of this intimate relation with the problems studied can be plainly seen from the results that have been obtained at these three laboratories. This is especially true in the case of Insect Investigations at the Arendtsville Laboratory, on which I have been asked to speak.

The work on Fruit Insects in Adams County has been divided into three parts; (1) a survey of the insects causing injury to the fruit; (2) a study of the life history and habits of the more important of these insects; (3) spraying and dusting methods to control these insects. Considerable progress has been made along all of these lines, but the most remarkable discoveries have been secured in making a survey of the insects injurious to apple. Several new insects have been found which are serious pests. Of these I will mention only two: The European Plum Mite (*Paratebranychus pilosus* Can. and Fran.) and the Red Banded Leaf-roller (*Eulia velutinana* Walk.)

The date of introduction of the European Plum Mite into America is unknown, but judging from its wide distribution there is no reason to doubt that it has been here for a long time, but has been overlooked. It was first discovered in Adams County in 1918, although orchardists tell me that they noticed injury of this sort at least four years previous to this date.

The Red Spider or Mite is brilliant red in color and very small. The ordinary fruit grower might overlook the presence of these animals on the leaf. They lay their eggs in the Fall on the branches, and sometimes on the trunks of the trees. These are also red in color, and because of their abundance cause the branches to appear red in color. This Fall the eggs are very abundant, and all conditions point to an outbreak of these insects this Spring. The condition is the same throughout the entire State. The mites in the past have been injurious only to the foliage. They cause the leaves to turn brown, or slightly yellowish in color towards the middle of the Summer. This injury must not be confused with the bright yellow leaves which are frequently found underneath trees where the foliage is dense. In several orchards where the injury was serious the whole orchard presented a brown sickly color. Continued infestations of such a sort would no doubt have a decided effect upon the vitality of the orchard. During 1919 when the injury was most serious, considerable alarm was aroused among the growers affected by these mites, and in 1920 some experiments were conducted with Spray and Dust. The Lime Sulphur Spray showed considerable control over

the Dust. In California effective control with Sulphur Dust has been reported for citrus mites.

A second, and by far a more injurious pest discovered in Southern Pennsylvania, is the Red Banded Leaf-roller. I dislike the name of "Leaf-roller" because it conveys the idea that the insect feeds on the foliage, while as a matter of fact serious injury is done to the fruit.

No doubt this is the first time you have ever been addressed in Pennsylvania on the subject of Leaf-rollers. This is because Leaf-rollers have not in the past been considered injurious in this State. My investigations during the past two and a half years have shown that Leaf-roller injury is a serious problem in Southern Pennsylvania, and needs attention. I consider this insect important for five reasons: (1) The percentage of Leaf-roller-injury often reaches 40% in unsprayed orchards; (2) The percentage of Leaf-roller-injury has been found high even in the best cared for orchards. During the past summer Leaf-roller-injury has been found the chief cause of injury in many well cared for orchards. In such orchards Codling moth, Curculio and even Scab have been reduced to a minimum, while the injury by Leaf-rollers still remains too high. (3) The leaf-rollers in Southern Pennsylvania have revealed a late feeding habit. In some cases over fifty percentage of the Leaf-roller injury occurs within two or three weeks prior to picking time. On the average about 25% of the injury is done late in the season, while the balance occurs early in Spring, or during the Summer. (4) The late feeding worms have a preference for the fruit, making large scars in their sides. (5) There are three generations during the summer, thus increasing the difficulty of control and the amount of injury.

The Leaf-roller mentioned above is not the common Fruit-tree Leaf-roller, who is referred to so much in literature, but is a new species which has never before been reported as a pest on apple. The common Fruit-tree Leaf-roller has never been found in Southern Pennsylvania.

The Life History of this new species of Leaf-roller, the Red Banded Leaf-roller, is being studied carefully at the laboratory. Considerable data has already been secured. During the winter the Leaf-roller may be found as a cocoon in dried curled leaves beneath the trees, or hiding beneath stones or other rubbish. The moths emerge in Spring, during the latter part of April, and lay their eggs on the trunks and branches of the apple trees. These eggs are pale green in color, and in flattened masses of about 80 to 100 eggs. These hatch shortly into small worms, which at first feed on the leaves, and later on the fruit. There are three generations during the summer, and it is the third generation which produced the late injury to the fruit. This injury has frequently been confused with late, or side injury, produced



by Codling moth. Codling moth, as a matter of fact, has been found far from serious in Southern Pennsylvania.

The injuries produced by the worms of the Red Banded Leaf-roller, as mentioned before, are of two sorts—early and late injury. The early injury is produced when the fruit is small. A large percentage of these fruits fall as a result of the injury. Those which remain on the tree heal over, and at picking time appear as deep russety cavities on the fruit. The late injuries are shallow, often the larva merely removes the skin of the fruit. These cavities are often large, and never heal over.

Both Spray and Dust have been tried against Leaf-rollers with fair success. The spray has, however, given slightly better results than the dust. It is peculiar that Dust with 3% nicotine has given much better results in the control of Leaf-roller as well as Codling moth and Curculio, than Dust with 1/2% nicotine. These results have been secured from but one season's work in dusting and spraying experiments in three different orchards, and must be correlated with future experimental work to be of much value.

**Calvin Miller:** Does the Leaf Roller make the long mark on the leaf of the apple?

**Mr. Frost:** I believe that is the Leaf Roller that you describe. I will show some pictures soon that will show this plainly.

**Question:** How late in the season was this spraying done?

**Answer:** The last spraying at both these orchards was about the middle of July.

**Question:** What strength material was used?

**Mr. Frost:** 90-10 dust and lime-sulphur as a spray.

**Question:** How do you detect the presence of the Leaf Roller?

**Mr. Frost:** That is a rather hard thing to do unless you have a specialist on the field, an entomologist from State College or Harrisburg. Unless you have someone of this kind you will have to see the work and find the eggs on the trees, but I think in any well regulated spray schedule, as any good orchard man should put on, you will not have trouble with these things. The thing is to go ahead and spray according to the spray schedule, putting on five applications, and you are bound to get it down to a small percentage.

**Question:** At what specific gravity strength do you use lime-sulphur?

**Answer:** 33 or 34 specific gravity.

**Question:** What solution did you use mostly?

**Answer:** 1 to 30. It varies in strength. In fact, we

always mix the lime-sulphur according to the chart, but on the average it was 1 to 30.

**Question:** Does the dormant spray have any effect on killing the eggs?

**Mr. Frost:** I have no idea that it will kill the eggs, but the dormant spray may have some value in killing the early beetles.

**Question:** Will diluted lime-sulphur 1 to 30 burn foliage?

**Mr. Frost:** We have used it up until the last of July without any injury excepting where drenching was done, and then we got slight injury.

**Question:** What killed the beetle?

**Mr. Frost:** Arsenate of lead. In 9-10 dust there is sulphur and arsenate of lead.

**Question:** What strength arsenate of lead?

**Mr. Frost:** We used one pound to fifty, and in some cases one and a half pounds to fifty. The margin of one pound to fifty is a little weak, although we have done it.

**Question:** Do you recommend that for Codling moth also?

**Mr. Frost:** Yes.

**Question:** Does nicotine added have any effect on Leaf Roller?

**Answer:** I do not know about the sprays, but I do know that all the way through in dusting work, where we had a higher percentage of nicotine in the dust we got better control for the Curculio, Codling moth and Leaf Roller. It seems that nicotine does have some effect in controlling this pest.

Have you tried calcium arsenate? Did it burn the foliage?

**Mr. Frost:** We have tried magnesium arsenate. With the materials we were using we got no burning from magnesium arsenate, and we put it on heavy.

**Question:** What causes the crescent-shaped injury to the apple?

**Mr. Frost:** That is Curculio injury. It is the same injury which causes the trouble on plum, and is known as Plum Curculio, and it works also on apple. It is a scar we often find.

**Mr. Fenstermacher:** In response to circulars that were sent out last Fall in regard to the fruit situation I got in correspondence with B. G. Pratt of New York, and he outlined some things in his letters which I thought were well worth while putting before the society here, and he has consented to come and speak to you.



Mr. Fenstermacher: I now wish to introduce Mr. B. G. Pratt, who will please come forward.

### SOME MARKETING PROBLEMS

By B. G. Pratt, New York, N. Y.

Mr. President, and fellow members of the State Horticultural Association of Pennsylvania:

In answering our president's letter on marketing this Fall, I incautiously expressed an opinion on one or two abuses that I thought ought to be corrected. He committed another and greater indiscretion in asking me to address you on the subject.

Some one has facetiously remarked that a woman's dress should be, like a good address, long enough to cover the subject, yet short enough to please. I shall not even attempt to cover the subject, but I will endeavor to make it short enough to please.

Most of you know me as belonging to that unfortunate class of insecticide manufacturers, whom like the lawyer, the doctor and the undertaker, nobody loves yet cannot do without; but comparatively few know that for the past ten years I have been engaged in orcharding as well, and at present have 26,000 trees and 10,000 more to plant out this Spring. So you see that as a fruit grower I have all of your problems and sympathize with you.

Some of these problems I have solved, but the problem of marketing looms up larger and larger each year and is taking more time and attention than any other. I was unfortunate this Fall in having my harvesting and marketing arrangements disorganized by sickness, which resulted in my having several thousand bushels of fine drop apples that I could not sell at any price—I understand there are others—yet apples not as good were being retailed at 60 cents a peck in my own home town in New Jersey. Why?

This summer I went on a Farm Bureau picnic, and after a good dinner when everyone should have been in the best of humor, the truck farmers began an unusually doleful tale of woe. They spoke of selling cabbage at 50 cents to \$1.00 per hundred; lettuce at 20 cents to 25 cents a dozen heads, etc., etc.

This was a great surprise to me. The groceryman was charging from 10 cents to 15 cents a pound for cabbage and 12 cents to 15 cents a head for lettuce. The farmers on the roadside stands were asking for 25 cents to 30 cents a head for cabbage and 10 cents to 12 cents for lettuce. I had had no occasion to get the wholesale prices, and to me and the average consumer, the wholesale price was reflected by the price on the roadside stands on the farm, and there

did not seem to be any great disparity of prices. In fact, when we take into consideration that the groceryman delivered the goods to your door, it really was cheaper at the present prices for gas. The only possible advantage was the prospect of getting vegetables a little fresher. I had no idea, and I do not believe that nine hundred and ninety-nine out of every thousand consumers had any idea that they were paying from one to two thousand per cent over original cost.

Last Fall I noticed pears selling for 15 cents a quart or \$1.50 to \$1.75 for a fourteen quart basket along the roadside on the farm, yet pears were then rotting under the trees, and many fruit growers were glad to get \$1.00 per bushel after they were packed and hauled to town. Who is most to blame for these conditions? The growers themselves, by making it possible for the profiteering retailer to get the prices he asks.

I know that the retail merchants in Washington Market, New York, asked as much for tomatoes this Summer when they were rotting in the New Jersey fields, as they did last Spring when they were shipped all the way from Florida. With the increasing number of roadside markets and the automobile traffic which takes the urban population in such great numbers by our farms, the farmer is in position today to set the retail price of his produce. Had the farmer at the roadside market asked 5 cents a head for lettuce and 4 cents to 5 cents a pound for cabbage, and 5 cents a quart for pears, he would have been fully repaid for the extra trouble, and forced the town and city market to be satisfied with a reasonable profit, and created a demand which would have quickly absorbed the surplus, and there would not have been the waste such as many of us experienced this past season.

During the past four years, fruit and vegetables have been so high that no one but the hired man and the millionaires have been able to eat all that they needed, much less wanted, yet the grower, with few exceptions, has not received his share for production.

While in Pennsylvania some time ago I was informed that a grower sold a number of bushel baskets of apples to a storekeeper at \$1.50 each. The next day he happened to be in the store and asked one of the clerks what he was getting for those apples, and he said \$4.00 a bushel. In other words, the man who had sprayed, cultivated, fertilized, picked, packed and delivered that bushel of apples got a total of \$1.50, not figuring the cost of growing an orchard and invested capital. The man who had invested only \$1.50 in those apples wanted a profit of \$2.50 for handing it over to the consumer.

I believe in this case this grower should have bought a



bushel of these apples and required a bill for same and reported it to the Department of Justice. The only difference between this man and sugar profiteers and meat profiteers, who have been brought to justice, is in the magnitude of the deal. We never can and never will be able to raise fruit profitably where such extortionate rates are charged by the distributor.

The waste on the average fruit farm is appalling and unbusinesslike, yet thousands go hungry for this health-giving food or pay the extortionate prices for it. If it were possible to eliminate this tremendous waste and provide adequate distribution, there would be ample consumption for all the fruit and vegetables we can produce and at a good profit to the producer.

The present slump in buying is not due to a scarcity of money or over-supply, but is due to re-action from the orgy of spending, waste and profiteering through which the country has just passed, and it is the most promising feature of business conditions today, which will all the quicker bring about a new era of solid prosperity. We have stopped spending; we must cut out waste and profiteering.

How is it going to be done? By co-operation and by applying the highest principles of merchandising and business. This certainly does not mean that we are to neglect our orchards or farms, or buy inferior supplies because it takes less money or we get better terms, but on the contrary we should give them better care to make them more productive; buy only such supplies as will give the greatest returns for the money, and at the same time cut out every unnecessary expense.

A good merchant does not quit because he loses money or fails to make a profit on the year's business, he does not cut out advertising, but will more carefully go over his advertising to make it more attractive and get out and hustle all the harder. Don't waste money, but don't save a penny and lose a dollar.

A few weeks ago I had the pleasure of attending the Washington State Horticultural Society meeting at Spokane, Washington, and the question of co-operation and distribution was the liveliest question before that meeting. What success they have made in the past only shows them the necessity and advantage of closer co-operation and better business methods. Necessity is the mother of co-operation.

The West has shown us the possibility and advantage of growing better fruit. They have shown us what a tremendous handicap co-operation will overcome. Are we going to wait until they have captured our markets, forcing lower prices for our apples and the loss and waste we experience

this year, before we wake up to the necessity of co-operation to even regain the ground we have lost?

A gentleman the other day was looking over an insane asylum and noticed one guard marching some twenty lunatics around. He asked the keeper if he was not afraid they would jump on him some time. He said, no, that he could lick any two of them. "But suppose they combine," he asked. "They won't combine; they are crazy. They don't know anything about co-operation." That is the feeling in the Northwest,—that a man who does not co-operate is crazy and belongs in the lunatic asylum. Every individual is competing with every other seller. Consequently, the Northwest is endeavoring to combine all of the Associations into one big association that will eliminate to the greatest degree the competition among themselves.

Can we do it? Yes. True, our problems are different. We cannot use all their methods, but we have less disadvantages than the Northwest to overcome, and if we will use the same amount of brains, thought and study that they have, we can meet and overcome our difficulties; not in a day or a year, but each year will add to our knowledge and bring us nearer to success.

In some sections, the fruit and vegetable growers can combine and open co-operative stores for the sale of their products. In others, the fruit growers can combine under certain brands and advertise them like "Skookum," grown with care and packed under certain standards at central packing houses, and having a central selling organization. The Federation of Farm Bureaus or the National Research Council, I believe, will lend their aid and advice just as soon as we growers will qualify for discharge from the asylum and co-operate, and not individually or collectively assist the profiteering retailer in setting the price for us.

Mr. G. Harold Powell, General Manager of the California Fruit Growers' exchange, says:—

"The average jobber's margin on oranges for example is now less than 10% on the selling price, while the retailer's margin is about 25%. These trade margins, which are the lowest of any on the fruit crops, have been gradually reduced because the growers have furnished an even dependable supply of standard crops of advertised fruits to the markets where they are to be sold."

This has been accomplished by co-operation, standardization and advertising.

Mr. Fenstermacher now asked Mr. Griest, Vice President, to take charge of the meeting, who called upon Mr. R. C. Walton of the Field Experiment Station at Arendtsville, Adams County, Pa., for an address on "Black Rot and Frog Eye of the Apple."



## CONTROL OF THE FROG-EYE LEAF SPOT OF APPLE

By R. C. Walton, Arendtsville, Pa.

Frog-eye is a leaf spot of apple attacking many different varieties. In spite of the fact that it has a very characteristic appearance it is frequently confused with Cedar Rust. Typical frog-eye spots in late summer are brown, irregular or lobed in outline and have a light gray center, where as the cedar rust spots at this time of the year are yellow or orange in color with a darker center and with projections on the under side of the leaf.

Frog-eye is a fungous trouble produced by spores and fortunately can readily be controlled by protecting the foliage with fungicides. In some localities where the conditions are especially favorable for fungus development, that is orchards on low ground with abundant moisture, frog-eye is a very serious disease, so serious that 95% of the foliage may drop by midsummer if the sprays are not applied thoroughly and at the proper times. Serious cases which produce partial or total defoliation result in reducing the size of the fruit and in lowering the vitality of the trees so that the fruit buds may either fail to form or are greatly weakened. Because of the fact that the leaves furnish the food for the tree, it follows that with the loss of these leaves not only the fruit but the entire tree will suffer. Measurements made of thousands of apples showed that unsprayed trees yielded 2 inch apples and trees sprayed three times yielded apples with an average diameter of 2.65 inches.

Experiments for the control of frog-eye were conducted in Adams County Pennsylvania in 1918, 1919 and 1920 in six different orchards. Various fungicides were used such as commercial and home made lime sulphur, bordeaux mixture (home made,) Pyrox, Sulfocide, 85-15 and 90-10 sulphur dust. Excellent results were obtained from some and poor results from others.

In brief it may be stated that in 1918 and 1919 three applications of the commercial or of the home made lime sulphur gave approximately the same results as the same number of sprays of home made bordeaux mixture, good practical control being obtained. No difference could be seen between the commercial product and the home made lime sulphur. During these years it was found that the "pink" spray, that is the application given just before the blossom buds open, was somewhat effective against frog-eye, reducing it about 6%. In other words some frog-eye infection took place during the blossoming period and if maximum control is to be obtained the "pink" spray is necessary. Pyrox gave fair control but not as good as



TYPICAL FROG-EYE SPOTS AS THEY APPEAR IN LATE SUMMER



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either lime sulphur or bordeaux mixture. Some foliage injury resulted from the use of all forms of lime sulphur and also from bordeaux mixture and Pyrox. That which resulted from the use of the copper sprays was in the form of small irregular dark brown spots some of which closely resembled immature frog-eye spots. The injury resulting from the use of lime sulphur was a burning around the edge of the leaf, producing a browning of the tissues and curling of the leaf. It was only in severe cases that any defoliation occurred and then not sufficient to hinder the growth of the fruit. A slight amount of russetting on the fruit of Stayman Winesap was noticed in the lime sulphur plots.

Sulfocide and 85-15 dust gave relatively poor control with one trial only of each. These materials should be given additional trials.

In reading these results it must be borne in mind that the amount of frog-eye infection in 1918 and 1919 was very heavy in the orchards where these experiments were conducted, which fact therefore made the disease harder to control than it was in 1920 when the infection was comparatively light.

In 1920 no fungicides were used except lime sulphur and 90-10 sulphur dust. Two applications of commercial lime sulphur ("pink" and "petal fall") were not sufficient to give effective control. Three applications ("pink," "petal fall," and 10 days after the petals fall") reduced the frog-eye to 3.7% and four applications to 2.2% showing that the fourth application given two weeks after the third, was not necessary in 1920 for the control of this particular disease. Five applications of the same material, the fifth given five weeks after the fourth, for some unknown reason did not give quite as good results as four sprays. This is probably due either to the fact that this plot lies close to a wood-lot and stream where conditions are very favorable for fungous development or to the fact that certain trees may not have been effectively sprayed. At any rate from the growers standpoint the difference is so little that the results in one plot are just as good as those in the other.

Sherwin Williams Dry Lime Sulphur used as a liquid spray and at the strength recommended by the company gave very satisfactory and almost as good results as the commercial product bought in liquid form.

90-10 sulphur dust gave good practical control in 1920, five applications reducing the disease from 66.7% in the unsprayed or check plots to 10.19% in the dusted plot. When the "10 day" dust application was omitted there was 8.5% more frog-eye present, showing that this application is an important one for this disease. While dust gave apparently good results in this season of light infection (1920), commercial lime sulphur gave much better results, the same



number of applications applied at the same time reducing the frog-eye to 3.3%.

During the years 1918, 1919 and 1920 when these control experiments were under way another experiment was being conducted to determine the exact time when frog-eye infection takes place and also the meteorological conditions existing at this time. Rainfall and temperature records were secured by placing instruments either in or close to the orchard and some very interesting data secured. The results of the three years experiments show that each year the great bulk of frog-eye infection took place from the time the petals opened until two and one-half weeks after they fell, which in a normal year in Adams County would be about the latter part of May. While some infection took place when the blossoms were open the majority of it occurred after that time. Through the month of June there was usually some frog-eye infection but relatively little as compared to the month of May, and from June on through the summer months there was so little that it could be considered negligible. In other words infection seemed to take place almost altogether when the leaves were in a growing condition.

A very interesting point brought out by the meteorological records is the fact that the amount of frog-eye seems to be correlated closely with rainfall and temperature. In a spring of light rainfall and low temperature, as for instance May 1920, the amount of frog-eye was very light while in a Spring of heavy rainfall and higher temperature, as in 1919, the amount of frog-eye was very heavy. In 1918 when the frog-eye was more abundant than in 1920 the amount of rainfall was heavier.

As a result of the three years work on frog-eye the following conclusions and recommendations can be drawn:

1. No varieties immune to frog-eye have been found.
2. Severe attacks of frog-eye result in undersized fruit, loss in vitality to the trees, weakened fruit buds, and eventually death to the trees if the attacks continue unchecked.
3. Some frog-eye infection takes during the blossoming period, but most of it occurs from the time the petals fall until two and one-half weeks later; in other words, when the leaves are in a growing condition.
4. Severe cases of frog-eye seriously affect the size of the fruit retarding its growth and making it worthless except for cider.

5. Considerable spray injury of the foliage resulted from the use of all materials except Sunlfocide and Dust, none of which however was so serious as to affect the fruit.
6. Of the materials used Commercial and home made Lime sulphur, Dry Lime sulphur, Bordeaux mixture, and Pyrox gave good control, Pyrox not giving quite as good results as the others. Sulfocide and 85-15 Dust gave rather poor results in a season of heavy infection. 90-10 Dust, in a season of light infection, gave good practical control although not as good as lime sulphur.
7. Since much of the frog-eye seems to come from dead twigs on the trees, it is an excellent practice to prune and burn this source of frog-eye infection before growth starts in the Spring. Also never allow brush to accumulate in the orchard.
8. Spray as follows:
  - 1.—Just before the blossom buds open.
  - 2.—When three fourths of the petals have fallen.
  - 3.—Ten days to two weeks number two.
  - 4.—About the middle of June if infection promise to be severe.
9. For efficient frog-eye control the sprays absolutely must be applied thoroughly and timely.

# FROG-EYE CONTROL FOR 1918, 1919, 1920

	Treatment	No.	Applications—Time	Average Percent.
Av. for 1918 and 1919	Lime Sulphur (4 plots)	3	Pink, petal fall, 10 day spray	18.0
	Lime Sulphur (5 plots)	2	Petal fall, 10 day spray	24.2
	Bordeaux Mixture (3 plots)	2-3 *	Pink, petal fall, 10 day, ex- cept pink omitted in one plot	19.8
	Pyrox (3 plots)	2-5 *	Pink, petal fall, 10 day spray, except pink omitted in one plot	28.5
	Sulfocide (1 plot)	3	Pink, petal fall, 10 day spray	65.5
	85-15 Dust (1 plot)	3	Pink, petal fall, 10 day spray	80.4
	Check—Unsprayed (17 plots)			79.4
	90-10 Dust (1 plot— Stayman W.)	5	Pink, petal fall, 10 day spray, 4 and 9 weeks after petals fell	10.2
	90-10 Dust (1 plot Stayman W.)	4	Pink, petal fall. 4 and 9 weeks after petals fell	18.7
	Com. Lime Sulphur (1 plot Stayman W.)	5	Pink, petal fall, 10 day spray, 4 and 9 weeks after petals fell	3.3
1920	Com. Lime Sulphur (1 plot Stayman W.)	4	Pink, petal fall, 4 and 9 weeks after the petals fell	3.0
	Check—Untreated (2 plots Stayman W.)			66.7
	Com. Lime Sulphur (1 plot York Imperial)	2	Pink and petal fall	38.1
	Com. Lime Sulphur (1 plot York Imperial)	3	Pink, petal fall, 10 day spray	3.7
	Com. Lime Sulphur (1 plot York Imperial)	4	Pink, petal fall, 10 day spray, 4 weeks after petals fell	2.2
	Com. Lime Sulphur (1 plot York Imperial)	5	Pink, petal fall, 10 day spray, 4 and 9 weeks after petals fell	5.2
	Dry Lime Sulphur (1 plot York Imperial)	5	Pink, petal fall, 10 day spray, 4 and 9 weeks after petals fell	7.2
	Check—Untreated (1 plot)			75.1

\*Some plots received two and some three applications.

**Question:** Did we understand you to say that lime-sulphur gave the best protection?

**Answer:** I would not say that it gave better. In fact, if you average up three years' work you will find that Bordeaux Mixture gave slightly better. Lime-sulphur, however, gave very good results.

**Question:** Did Sulfocide show up well?

**Mr. Walton:** Not very well. It has only been tried out once, but that is not enough to condemn it. It ought to be tried out again. I would not say from the results of one year's work that we should condemn it, and it should be tried further for definite results.

**Mr. Hershey:** From all points for practical purposes you would think from your results that lime-sulphur would control it well enough.

**Mr. Walton:** Absolutely.

**Question:** Should lime-sulphur 1 to 30 control it?

**Mr. Walton:** I think it should.

**Question:** What was the relative effect of Bordeaux and lime-sulphur in the control of Black Rot?

**Mr. Walton:** We have very little Black Rot. The organism that causes Frog Eye is supposed to cause Black Rot also, but there is very little of it in Adams County, and I can not say definitely.

**Question:** Was the defoliation in 1919 due to Frog Eye, or would Scab have the same effect?

**Mr. Walton:** I should say that Frog Eye was mostly responsible for it, especially on York Imperial. There was very little Scab on York Imperial. It might have been partly responsible. On Stayman Winesap there was some infection, although it was not extensively injured.

**Mr. Stear:** How general was Frog Eye in Adams County?

**Mr. Walton:** These results are in one orchard for three years, a York Imperial orchard.

**Mr. Stear:** Did the average orchard in Adams County show much infection, I mean?

**Mr. Walton:** No, I can't say they did. Our results are from individual orchards.

**Mr. Stear:** In Franklin County we did not find any orchards infected to any degree with the Frog Eye.

**Question:** What is the most important step in this Frog Eye spray?

**Mr. Walton:** The most important thing is to make the application at the proper time. I know many orchards that used the proper strength also, that did not do the work



thoroughly, or at the proper time, and did not get results. Penetrate the trees inside and outside, cover every square inch, and you will get control. If you thoroughly cover the leaves you will kill the spores.

**Dr. Stewart:** Several years ago we found in Bedford County that on trees that had not been fertilized with nitrogen we got complete defoliation by the first of September, and often in August, and practically no defoliation on trees that had been properly fertilized in the same orchards. The spraying had been the same in all orchards.

**Mr. Walton:** I have noticed that in some orchards that have not been fertilized the infection was heavy in Adams County.

**Dr. Stewart:** There was considerable infection but no defoliation on the unfertilized trees which I mention.

Prof. R. D. Anthony was now introduced to the Association, and spoke as follows on "Cultural Methods and Fertilizers for the Apple:"

#### CULTURAL METHODS AND FERTILIZERS FOR THE APPLE.

By Dr. R. D. Anthony, State College, Pa.

The history of apple orchard fertilizer experiments runs back for more than a quarter of a century. The first reports of these early experiments gave us many apparently conflicting results, and started some rather warm controversies which probably did not aid in clarifying the situation. Twenty-five years of agricultural development have added tremendously to our knowledge, and have given us many different view points. Because of the clarifying light that time has thrown on the problem, we now seem able to go back over our apple fertilizer experiments and clear up some of the conflicting statements and make some fairly definite recommendations for Pennsylvania practice.

Although a number of reports have been made before this society on this subject, they were mostly presented during the controversial period while many points were still but vaguely understood, and because of this, the program committee thought it wise to have a report bringing these experiments to date, and have asked me to present this.

We add fertilizers to the soil to bring about qualitative and quantitative change in the soil solution from which the tree secures the necessary material for growth and fruit. But we may also bring about changes in the soil solution in other ways. It would hardly seem possible that the soil solution under a timothy sod of long standing would be the same as under clean cultivation, and carefully conducted

chemical studies have now confirmed this view. Varying treatments of the surface may be fully as effective, if not much more so, than varying fertilizer applications, in causing profound changes under the surface. Thus we have two different methods of bringing about the same or similar results, that is, modifying the solution from which the tree obtains its nutrition. With this the case, we can see how impossible it would be to study the effect of fertilizers and at the same time entirely turn over to type of cultural treatment given the soil, yet this was the case with many of the early fertilizer reports and it is no wonder that greatly conflicting results were presented. When we study the results of a fertilizer experiment, we must know every detail of the treatment the soil has received during the life of the experiment and for sometime previous, if the conclusions which we draw from the experiments are to be reliable.

Let us take the two chief subdivisions of culture—sod and tillage—and study the problem of fertilization under each.

Pennsylvania differs from her competing State, New York, in that more than half her bearing orchards are in sod. Our orchards are usually hillside orchards and generally on soil types that wash easily so that cultivation is a difficult task. Just why there should be any difference we cannot say, nevertheless, mature sod orchards in this State when given proper treatment, seem to give better results than the same treatment in New York. With the increased cost of labor, the cost of tillage has become a considerable factor and we will probably see an increase in the number of orchards that are all or part of the time under sod, so that question of the proper fertilization of sod orchards is a vital one. To be sure, we will still keep our young trees under cultivation with intercrops, wherever such treatment is possible.

There are certain phases of the problem in the sod orchard which we can dispose of quickly. We do not need to turn to any of our experiments to show the lack of wisdom in attempting to grow orchards in permanent timothy or blue grass without fertilization.

There are thousands of such orchards around the State that show, by their yellow color, their small annual growth and their unprofitable crops, that to use such a system is to court disaster. We should be very certain of our reasons before we put an orchard permanently into grass, without planning to use fertilizer, and we should watch our foliage and our yields with the greatest care to be sure that our reasons are proving sound. At the first sign of lessened vigor of the foliage or of decreasing yields, the fertilizer applications should begin.



Since we are to use fertilizer on the sod orchard, what materials should we use, how much, and when should they be applied? These questions are not so easily settled. The one element that has consistently given profitable returns in the sod orchard is nitrogen. Phosphoric acid in some places has given returns but in others has been of no value. Wherever phosphoric acid will give an increased sod growth, its use is advisable. If potash has shown any value it is only on thin, sandy soils, and, until we know more about this element, it would seem safe to drop it out of our Pennsylvania apple fertilizers. The best forms in which to use these materials seem to be in nitrate of soda or sulphate of ammonia and acid phosphate.

Our knowledge of the proper time to apply our fertilizers is none too reliable, but every indication would point to the value of an application made before the leaf bud breaks.

Within the last two years much has been said of the value of permanent sods of alfalfa and clover. For years our friends of the Pacific Northwest boasted of the inexhaustible fertility of their deep soils, but there came a time when many of their orchards began to show signs of malnutrition, and the growers found that, under their climatic conditions, years of clean cultivation without cover crops, had so burned up the humus of the soil that the vigor of the trees was seriously affected. When these same orchards were put down in clover or alfalfa, the trees regained their normal vigor. This is an extreme case, and the results would not be so marked under our climatic conditions, but it shows the possible value of legume sods.

We have a number of orchards in this State doing very well in alfalfa without the application of fertilizers, and while our knowledge is still to slight to recommend such practice, it seems possible that we may be able to cut out, or at least to cut down the use of fertilizers in our sod orchards by the use of clover or alfalfa.

The question of fertilizers in the cultivated orchard is still to some extent in the controversial stage, but here also a better understanding of the conditions of our trees will remove some of the misunderstandings. We have a considerable number of experiments dealing with fertilizers in the cultivated orchards in New York, in England, in Pennsylvania, New Hampshire, Ohio, Oregon and several other states. In all these, orchards growing in soil of at least moderate fertility, and receiving annual tillage followed by the growth of a good cover crop, they have failed to make a profitable response to fertilization. Here and there gains have been secured, but when the land was reasonably fertile, and the cover crop growth fair, the gains were not sufficient to justify the cost of treatment.

On the other hand, there are a few cases where orchards that, either through neglect or inherent defects, were

lacking in fertility, have made profitable response to added plant food. These, however, are the exceptions, and it would seem safe for us to say that here in Pennsylvania there are very few orchards located in poor enough soil so that we could expect to get our money back from the use of fertilizers when cultivation is given annually and a cover crop grown.

As a result of the many experiments carried on both within and without the State, we are in a position to make some fairly definite recommendations for Pennsylvania. They are:

1. Young trees up to the time of coming into bearing should be given clean cultivation. This can usually be accomplished most cheaply by the growing of inter crops. When the land is too steep for such treatment, strips of sod should be left between the rows to break the wash and check erosion.

2. Mature trees on soils where the slope will permit it should be cultivated for one or two years, and then seeded to clover or alfalfa for two or possibly three years, and again cultivated. When such orchards are on soils that are in poor condition it will pay possibly to use small amounts of nitrogen and phosphoric acid.

There are two cautions to be observed with orchards under cultivation: the land should be plowed early, that is before the blossoms break, and the cover crop should be seeded early, at least by the first week in July except in very dry seasons.

3. Mature trees on soils where washing is serious can best be handled in permanent sod. As high a proportion of legumes should be maintained in those sod orchards as is practical. This may necessitate occasional plowing, or better discing, and reseeded, in which case alternate rows only should be worked at one time.

4. Mature trees standing in sod which contains but a small proportion of legumes should receive from 5 to 10 pounds of nitrate of soda, or slightly less of ammonium sulfate per tree, and it will probably pay also to use an equal amount of acid phosphate but no potash.

5. In all our operations the appearance of our tree should be our guide. When the tree is making from one and a half to two feet of annual growth, with dark green leaves which hang on well into the fall, and is bearing profitable crops, we may be sure our method of handling has no serious faults. When our growth slows up, the leaves become a yellowish green, and crops are irregular it is high time to overhaul our methods of culture and manuring to find our mistakes.



**Question:** In an orchard in sod eight or nine years old what fertilizer would you recommend, and what is the value of sulfate of ammonia, and how much do you use?

**Prof. Anthony:** Now you are asking a question that none of us can say with absolute certainty. It is a guess. I can make a guess, and you can make a guess. As I said in my last recommendation, put the question up to your own trees, and answer as to whether or not your guess is correct. I am guessing. Under those conditions I would say that from three pounds to five pounds of nitrate of soda, or two to four pounds of sulfate of ammonia is probably as safe a guess as we could make without knowing the orchard thoroughly. If I knew that the addition of acid phosphate, under the conditions in which that orchard is growing, would have any effect on the sod I would use the four to five pounds to a tree. That is simply my guess. But I want to impress on you the importance of putting it up to your own trees to prove whether your guess is right, and, personally, if I had that problem to settle I would lay off blocks in the orchard, and see if I could detect difficulties. Here I would leave off one thing, and here I would make some other variation, here two pounds, here six pounds, and so on. It is difficult for the fruit grower to discover minor difficulties, but if the fruit grower can do this and have different trees in separate plots under different treatment, he will be able to get best conditions for himself, and it will pay in the long run.

**Mr. Chase:** I would like to ask if on a farm orchard of five or six years in sod, if a man has plenty of stable manure, with what should he supplement?

**Prof. Anthony:** We have made tests of stable manure in the Pennsylvania orchards running back ten or twelve years, compared with the use of the chemical elements of nitrate of soda, acid phosphate and potash. We have given up the use of manure, and given up recommending it, not because it is not all right, but because of the difficulty in securing it, and because of its greater value to cultivated crops. If a man is growing nothing but orchards and has plenty of manure, use it, but there is this danger in the sod orchard. Sod receiving manure is almost certain to be riddled with mice, and you have a problem there that is difficult to settle. That is one reason. The other is the difficulty of securing it. If a man has manure use it, and I do not believe it needs any material added to it to use for plant food, not at least for the apple tree.

**Question:** Are you not afraid four to five pounds of nitrate of soda to an eight-year old tree is too much?

**Prof. Anthony:** It is a dangerous practice if the orchard has been under cultivation the year preceeding. I think you are safe with the six-year-old trees making a vigorous

growth to use four pounds of nitrate of soda, and I would say again here, "ask the trees." I would do this because I want to get a better sod growth as a mulch.

**Question:** Would you recommend in a permanent sod orchard to allow the alfalfa sod to lie year after year and accumulate?

**Prof. Anthony:** If I had a good growth of alfalfa, so that I could get two good cuttings, I would take off part of the first cutting, not taking it off in the same part each year, watching the trees all the time.

**Mr. Atkinson:** I have had experience in sod orchard, and I can not see any way that we can control mice under the present labor situation. It looks to me that cultivation on a pretty good hill even, is a pretty good solution.

**Mr. Horst:** We have used soft coal ashes. I have the soft coal ashes hauled there and put some around each tree, and have had no injury. In small trees we have had some injury, but we have overcome it by soft coal ashes. It seems the mice will not work in that. They only work where there is trash about them. Each year we keep it clean, and then we have the ashes there to protect the trees from mice. They do not like to scratch in coal ashes.

**Mr. Chase:** A simple and inexpensive protection against field mice is to take a newspaper and wrap it around one tree, and then take another paper and wrap it around another. Go along from tree to tree in this way, and you will completely protect them from mice.

**Question:** How about the mice under the surface of the soil.

**Mr. Chase:** That is not true of the eastern part of the State. The mice are above ground.

**Mr. Atkinson:** I would like to know if you have had any experience with pine mice in the orchard. Your experiences refer to the ordinary field mice. The pine mice are quite different and wide spread in their injury. In my orchard there are a great many. It is similar to the field mouse in appearance, and if seen on the ground you could not tell the difference, but they work differently. Their habit is to work entirely under the ground and on the roots. I had a lot of trees that I had to bridge graft heavily to counteract their injury. They will work in some cases even if you have ground mounded around the trees. A paper wrapped around the trees and wire guards do not have the least effect.

**Mr. Anderson:** I have two questions to ask. Concerning scattering of nitrate of soda and phosphoric acid broadcast is there any reason why lime spreader should not be used; the other question is in reference to the timothy sod which has remained many years? If the trees respond to



nitrate and phosphoric acid year after year is there any reason why sod should be plowed up at regular intervals?

**Professor Anthony:** Use anything to get the fertilizer on. Personally I should use it broadcast. With regard to sod we usually find that the use of nitrate of soda and acid phosphate will change the nature of the sod, and frequently will lead to the introduction of a few clovers here and there. I see no reason if you have plenty of humus, why the land should be plowed or disked.

In regard to mice injury in sod we have had only two cases of trees injured by mice in alfalfa, although we have had much injury of mice with trees standing in timothy sod. We are wondering if alfalfa sod in any way does discourage mice.

**Question:** Which is better sulfate of ammonia or nitrate of soda?

**Prof. Anthony:** Sulfate of ammonia does not act as quickly as nitrate of soda.

**Dr. Stewart:** I do not wish to give this as an absolute fact. In the application of nitrate of soda it is found that nitrate of soda is much more desirable in order to get benefits the same year.

**Question:** Is sweet clover objectionable in an orchard?

**Prof. Anthony:** Will Mr. Weaver answer that, please?

**Mr. Weaver:** We have not worked along the line of sweet clover long enough to say, and whether you will get the same benefits from it I do not know. We have a hillside and we can not raise alfalfa on it. I have had trees there for ten and twelve years, and could not get an alfalfa stand. We can get a successful stand of sweet clover by applying enough lime, and especially on thin soil we are getting better results from sweet clover than from alfalfa. It has been growing for six years and reseeds every second year, and we are trying to get the remainder of the hill seeded. I find that the section which has never been cultivated but has grown sweet clover for six years show that trees have two or three year more development, while those not in the sweet clover flock have never had an apple, and show no signs of bearing. The trees look much better on the section in sweet clover. Our results so far show that the sweet clover is one of the best crops we can get on a hillside orchard.

**Question:** What time of the year did you plant?

**Mr. Weaver:** We plant every month in the year. The best time is now from the middle of January to the middle of March.

Thursday Afternoon, January 27, 1921.

The meeting was opened by Mr. Fenstermacher, who called for the Report of the General Fruit Committee, which was given by Dr. S. W. Fletcher.

### REPORT OF THE GENERAL FRUIT COMMITTEE.

Dr. S. W. Fletcher, State College, Pa.

This is a summary of reports from 52 growers in 25 counties. Several of the prominent fruit counties are not included, but, on the whole, it fairly represents present conditions in the State.

#### Profits and Losses.

This has not been a profitable year for the apple industry. A few men, especially those who have good local markets, have had a fair return; but most of our growers, especially those in wholesale districts, have either barely broken even or have actually lost money on the season's operations. Tens of thousands of bushels of apples were not even harvested. Peach growers, on the other hand, had a good market. Averaging all the reports, it appears that the cost of producing apples increased about 50% in 1920 as compared with 1919, while the selling price declined fully 60%. The increase in cost of production was due mainly to the added cost of labor, packages and supplies. Only one of the 52 growers reports that the season has been reasonably profitable. This fortunate man is A. C. Hess and Sons of Franklin County who says: "The net profit was much smaller than last year but about compares with previous years." Following are representative statements, by Counties:

Beaver—"Cost of production same as in 1919 but prices 50c to \$1 per bushel lower. We are now getting \$2 to \$2.50 a bushel for our apples."

Lackawanna—"We shall do well to come out even; high wages, poor help, and cheap apples are responsible."

Blair—"Peaches \$2.50 to \$3 a bushel, but apples only \$1 to \$1.25 per bushel, which leaves no profit."

Lawrence—"We paid \$5 for 8 hour's work in 1920 and sell our apples for \$1.50 a bushel delivered at the market. In 1919, we paid \$4 for help and sold for \$2.50 to \$3 a bushel."

Bradford—"Cost of production was 100% higher than previous years, due to inflation of labor and materials. Prices below cost of production."

York—"I think I can break even but will make no money; other years could make good profit."



Clearfield—"Half the apples were not harvested."

Cumberland—"A profit in 1919; a loss in 1920."

Bucks—"I received mighty good prices for my higher grades of apples; for the medium and low grades I had to take anything that I could get."

These rather gloomy reports from some of the larger growers are offset to some extent by the experience of small growers for local markets, most of whom have averaged \$2 a bushel or better for apples, without packages. Unless the cost of production was excessive, even for these times, this should give a fair profit. Since such a large proportion of our fruit goes to local markets, it is likely that Pennsylvania apple growers have fared much better this year than the growers in states which are mainly wholesale.

#### New Planting.

It might reasonably have been expected that the high prices of 1919 would be followed by very heavy planting in 1920, but such is not the case. Nursery stock was scarce and high and it was difficult to secure the desired varieties. This was an effective brake on speculative planting in the spring of 1920, which is one of the blessings we should not forget to count today. The apple orchard survey made the past season shows that, leaving out of consideration the fast disappearing farm orchards, the strictly commercial apple industry in Pennsylvania is scarcely twenty years old; that fully half of the trees in our commercial orchards are not yet in bearing; that the period of heaviest planting was from 1910 to 1914. The planting of 1920 was only about up to the average of the years since 1914. Eleven counties report practically no new planting; nineteen report moderate planting; and five report rather heavy planting. The latter are all in south-eastern Pennsylvania and include the counties of Berks, York, Lancaster, Adams, and Franklin. Practically all of the new plantings are of apple and peach, but there is a notable increase in the acreage of sour cherries.

#### Varieties.

It is a sign of the shrewd conservatism of our growers that practically all the new planting is of standard sorts, such as Baldwin, Spy, MacIntosh, Stark, and Rome in the northern and western counties of York, Grimes, Stayman, Jonathan, and Rome in the southeastern counties. Stayman is forging ahead nearly everywhere except in a few northern and western counties. It seems destined to become the dominant variety of the State, supplanting even the Baldwin and the York. Delicious has made friends this year, although it is not likely to rival the foregoing standard sorts. Lehigh County reports, "Delicious shows up well; it has lots of color and flavor and good keeping qualities." Howard Anderson of York says, "I think highly of Mac-

Intosh and Delicious. They come early in the season when apples are in demand and are of high quality. I sold them in September this year for \$7 and \$8 a barrel, f. o. b. cars." Harrison S. Nolt of Lancaster County reports, "Delicious and King David are doing well here. Delicious is not at late a keeper as advertised but we can get good size and splendid quality." On the other hand, Gillam Brothers of Franklin County say, "Delicious shows some promise but I doubt if it will rival even some of the lesser sorts, not to mention standard varieties like Stayman, York, and Grimes;" while in Perry County, Delicious is reported as "undersized."

There has been no decided change in the relative popularity of peach varieties. Fully 50% of the new planting is Elberta and most of the balance is divided between Carmen, Belle of Georgia, Hiley, Champion, Iron Mountain, Salway, and Smock. The only comparative new variety of peach that has received extensive trial is the J. H. Hale. This is reported as "unpromising" from seven counties, but H. L. Breidenbach of Berks County says it "shows up well."

#### Insects and Diseases.

The loss from insects and diseases was not as serious in 1920 as in 1919, or rather the loss was not so apparent, for it is likely that this was due not so much to the actual absence of the pests as to the generally large crop, which made the loss less noticeable. Aside from our perennial pests, such as San Jose scale, codling moth, scab, and brown rot, the largest number of complaints have been of the red bug. This insect seems to have emerged later than normal—ly and the usual treatment of adding nicotine to the calyx spray was not always effective. The European red spider is spreading rapidly in Beaver County, Chester County reports that curculio was the worst pest. From all quarters of the State, especially from the southeastern counties, come reports of peach orchards that are dying from the Yellows. Unless this Association and our peach growers generally take concerted action with the State Bureau of Plant Industry to check the progress of this disease, it may practically wipe out our peach industry within a few years, as it has more than once in the past century and a half.

Dusting appears to have made very little headway this year. Seven growers report that it has not given as satisfactory results on apples as spraying, but all who have tried the dusting of peaches prefer it to spraying. H. F. Hershey of Berks County says, "Dusting controls curculio and brown rot on the peach but not apple scab." Two growers from Franklin County report that dusting is not satisfactory for apples. J. W. Prickett of Adams County writes, "From observation of dusting results for 1920, I conclude that it would be better to dust more frequently but use less material



each time." On the other hand, F. H. Fassett of Wyoming County dusted part of his apple orchard "with just as good results as on the sprayed part and much cheaper." It is evident that dusting has won a place for itself in the peach orchard but is still in the experimental stage in the apple orchard. However, five more years of experiments on dusting materials, machinery and methods of application may warrant a different conclusion. The last word has not been said, by any means.

### Co-operation.

Pennsylvania lags in horticultural co-operation. This is due not so much to the conservatism of our people as to the lack of incentive. In the past we have gotten good prices for our fruit most years, anyhow, so why co-operate? The answer might be, "So that we may get better prices," but this argument is not convincing to a majority of our growers, especially to those who sell in local markets. In reply to the question, "Has there been any progress in co-operative buying or selling this year?", all but one of the twenty-five counties answer, "No." In Adams County, the Biglerville Packing House has expanded its activities quite materially. The horticultural societies of Chester and Delaware Counties have done collective buying for several years; the Cumberland Valley Fruit Growers are still operating successfully at Chambersburg; there is some very interesting spraying and selling co-operation among a number of small orchards in Monroe County; and we have a few other small co-operative enterprises, especially in the Grange; but as a whole, we cannot say that co-operation in horticulture has made much headway in Pennsylvania. This year may mark the turning point, I do not see how our wholesale districts, especially in Adams and Franklin Counties, can afford to continue much longer without some kind of co-operation. The present policy of extreme individualism will lead to disaster in the long run.

The experience of this year has shown our need of more by-product plants and of more and better common storage houses. A majority of our growers cater to local markets and sell from common storage throughout the winter. Loss of fruit in common storage has been exceptionally heavy this year. We need a new type of house, one which can be cooled down more quickly and the temperature and humidity regulated more readily. Anyone who plans to build a storage house should visit the house of L. N. Marble of Canton. This has forced draught by means of electric fans, so that the air in the storage room may be completely changed in ten to twenty minutes. One of the disadvantages of most storage houses is the dryness of the air, which causes shriveling of the fruit. In the Marble

house, humidity is controlled by passing the air through a fine spray of water after it enters the building.

It is evidence of the sound foundation of which Pennsylvania fruit growing rests that after this most depressing season, only 5 of the 52 growers state that the outlook is unfavorable for future planting. I saw a newspaper article the other day in which the following statement was made:

"There is little room for further expansion of the apple industry in Pennsylvania; the experience of this year shows quite conclusively that our present plantings are more than sufficient to supply our needs." What nonsense! Perhaps it did not occur to the writer of this article that two-thirds of the 22,000,000 bushels of apples produced in Pennsylvania this year came from old, neglected farm orchards, not from commercial orchards, and that most of these farm orchards will be gone fifteen years from now, leaving the field to the commercial grower. Perhaps he did not know that more than 10,000 cars of apples are shipped into Pennsylvania every year from other states, 3,000 cars coming from New York alone in 1918. This fruit might just as well be raised here, if we have sense enough to develop our own resources and nerve enough to stand up against competition. As a matter of fact, to paraphrase the words of a famous general, "We have just begun to plant." We are not going to stop until our production is in some degree commensurate with our resources and the demand of the 9,000,000 people within our own borders. True enough, this has been a poor year, but 1919 was a good year and there are other good years coming. The average return of all the years will be fair for the man who does his work well. This is no time for pessimism, especially in this organization. Never have we had more right to feel confident in the future of Pennsylvania horticulture.

In the long run, this trying season is going to be a good thing for the apple industry of Pennsylvania. Some of us were getting altogether too "cocky." The contrast between 1919 and 1920 would be tragic were it not so funny. When I was on the survey last summer, I met nothing but rosy tinted optimism. My head hummed with tales of fortunes made in apple growing almost overnight. I quote from an article in the National Stockman and Farmer for November 6, 1920:

"Stephen Bowers refused \$125,000 for an orchard that cost him \$32,000 less than five years ago. Wilbur H. and Emory Thomas sold 40 acres to W. W. Dowey for \$38,000 and Mr. Dowey found he had a fortune of \$30,000 already hanging from the trees. This year, 1920, even greater profits may be realized." Evidently this article was written early in the fall! I know of several sales of bearing orch-



ards at around a thousand dollars an acre and the 1919 crop of some orchards in Adams County netted the owners that figure. Stock companies sprang up like mushrooms; the flashy prospectus gave convincing proof that an acre of apple orchard might reasonably be expected to average close to a thousand dollars an acre annually, over a series of years.

The awakening from the Arabian Night's Dream of easy riches has been painful, but salutary. Some of the men who paid big prices for orchards last year are going around with long faces now; their pocket books are flat but their vision is clearer. Some of the stock companies are in the hands of receivers. This poor year will be worth while if it freezes out of the apple business the speculators and get-rich-quick men and leaves the industry in the hands of the bona fide growers.

I hope this crisis in the apple industry will teach the wholesale growers of Pennsylvania a lesson which western New York learned years ago—the danger of over-specialization. Our competitors to the North have learned to combine apples with other fruits and farm crops in such a way as most fully to utilize man and team labor throughout the year. That is why they have been able to withstand several periods of depression during the past fifty years. That is why most of their farms will not show a red ink entry on the ledger this year, when many thousands of barrels of apples were not harvested. Southern Pennsylvania, especially the great apple valley and adjacent Piedmont, from Harrisburg, Pennsylvania to Staunton, Virginia—which is destined to rival western New York for supremacy in the apple industry within fifteen years—must take this lesson to heart. A large proportion of these fruit farms have practically no other source of income but the apple orchard. This is a mistake; fruit may be the major source of income; but there should be other enterprises, perhaps not so profitable in themselves, to tide over the lean years that always come and always will come in fruit growing.

The final word of the Committee is an expression of confidence in the future of Pennsylvania Horticulture. We believe there is opportunity for moderate and conservative planting, this year and for many years to come.

Mr. Chase: I believe I express the feeling of every person here with the hope that in the future Doctor Fletcher will continue the good work he has most admirably begun.

#### APPLE GRADES

Porter R. Taylor, Bureau of Markets, Harrisburg, Pa.

During the past year the first real effort of the enforcement of the Apple Packing Law of 1917 was made. War conditions and the abnormal labor situation which develop-

ed in 1919 and 1920 has made it a rather difficult problem for the average grower to meet the provisions of the Law exactly. Bearing this fact in mind the entire work of the Bureau of Markets along the enforcement of the Apple Packing Law has been an effort to educate the growers of the State to the requirements of the Apple Packing Law.

A set of regulations covering this Law was prepared and after criticism by a number of prominent growers was issued in printed form and a copy mailed to every apple grower in the State of Pennsylvania that the Department of Agriculture had any record of. Publicity was issued in printed form and a copy mailed to every apple grower in the State of Pennsylvania that the Department of Agriculture had any record of. Publicity was issued to the farm papers through the summer and early fall months regarding the provisions of the Law so that it is generally safe to say that every apple grower in the State has had an opportunity to learn the requirements of the Law.

In addition to this, a representative of this Bureau, Mr. W. C. Lynn, spent several months in Adams, Franklin and Cumberland Counties in work with the apple growers upon grades and market reports. Demonstrations were made whenever requested by County Agents and other interested persons to bring out the points which were required.

With the beginning of the shipping season, the inspection was transferred in a way to visits to wholesalers in the various markets of the State. This was done because we realize that the successful enforcement of this Law will depend entirely upon having the co-operation of the growers and the distributors and having their actual support in locating sources of violation. As a whole the dealers have manifested a very favorable reception to this work and believe that it will help considerably in getting away from deceptive packing and marking. These visits have continued up to the present time and will be continued until the close of the season. Perhaps the most important part of this work is that it makes possible the location of the individuals who are not complying with the provisions of the Law at the present time, either through ignorance or for some other reason. In every case that has been taken up we find that it has been because of ignorance of its provisions rather than any attempt to violate the requirements of the Act.

One point which has become self evident in this work is that the clause which permits the face of the package to be 15% better than the average of the balance of the package presents a problem for future adjustment. This provision in the case of a 2½ inch apple permits the packer



to legitimately place fruit 2 7-8 inch in size upon the face of the package. Of course, where the package is 2½ inch and up the size can legitimately be raised on the face of the package. The main question which comes up on this subject is whether it is desirable to permit this condition to continue in the future. I hope that there will be some expression of opinions upon this point before the close of the meeting today.

Many growers who sell in closed packages and supply local markets do not understand that the provision of the Law very clearly states that all apples grown in Pennsylvania and packed in closed packages must comply with these requirements. This means that hampers, which have wooden covers, and the more familiar round bottom peach baskets with a cover both require markings in accordance with the Apple Packing Law. The Act requires that the name and address of the packer, the name of the variety, and the minimum size of the fruit must be marked upon a conspicuous part of the package in block letters not less than 36 pt. Gothic. This means that the marks named must be stenciled or stamped in letters approximately ½ inch in size.

In connection with the enforcement of the Apple Packing Law it has seemed desirable that work on the establishment of State Grades for apples should be started. There is a demand from numerous sources for information regarding the ways by which a pack of apples satisfactory to the market can be prepared. The only way in which this can be done is to prepare a definite set of specifications which will be equally satisfactory to good growers and to distributors and dealers in apples. With such grades we will have a common basis of understanding which will certainly eliminate many of the difficulties that have come through misunderstanding in the past.

This subject was taken up with the Executive Committee of this Association and the specifications which the U. S. Bureau of Markets had formulated were used as a basis for this work. Every effort was made to secure criticism from every grower, who could be reached, upon these grades and their adaptability to Pennsylvania conditions. As a result of this criticism, certain changes were made. The most important of these was in the matter of tolerance of which we have adopted 5% for Fancy and 15% for B Grade fruit in place of the 10% which the Federal Bureau has advocated. It must be remembered that the vast majority of the fruit handled is quoted in the A and B Grades and that the specifications for the Fancy Grade are only of interest to a small number of growers of strictly high grade fruit. We have attempted to make these grades equally satisfactory for local market use and for commercial

shipment, the only difference depending upon the maturity of the apple. The tentative grades decided upon as follows:

#### **Tentative Apple Grades for Pennsylvania**

The provisions of these grades are entirely optional with the packer, and are entirely distinct from the requirements of the Apple Packing Law of 1917, which are mandatory for all closed packages of apples grown in Pennsylvania.

#### **Pennsylvania Fancy Grade**

Pennsylvania Fancy grade shall consist of hand-picked apples of one variety which are well formed, uniform in size, firm and mature, and which are free from decay, dirt, disease, bruises, insect or mechanical injury, and other blemishes or defects, except those necessarily caused in proper packing. Apples of this grade shall be packed in clean, strong packages. Each apple shall have the amount of color hereinafter specified for apples of this grade.

In order to allow for variations properly incident to commercial grading and handling, not more than five per cent by weight, measure, or numerical count of the apples in any package may be below the requirements of this grade.

#### **Pennsylvania A Grade**

Pennsylvania A grade shall consist of hand-picked apples of one variety which are firm and mature, which are free from decay, and which are practically free from dirt, disease, bruises, insect or mechanical injury, and other blemishes or defects, except those necessarily caused in proper packing. Each apple shall have the amount of color hereinafter specified for apples of this grade.

In order to allow for variation properly incident to commercial grading and handling, not more than ten per cent by weight, measure, or numerical count of the apples in any package may be below the requirements of this grade.

#### **Pennsylvania B Grade**

Pennsylvania B grade shall consist of hand-picked apples of one variety, which are firm and mature, which are free from decay, wormholes, and serious bruises, and which are not materially deformed or materially discolored.

In order to allow for variation properly incident to commercial grading and packing, not more than fifteen per cent by weight, measure, or numerical count of the apples in any package may be below the requirement of this grade.

#### **Unclassified**

Any apples which do not conform to the foregoing specifications of grade, or if conforming are not branded in accordance therewith, shall be marked "Unclassified."



### SOLID RED VARIETIES.

These percentages refer to the amount of surface of each apple colored and NOT to the degree or intensity of color.

Varieties	Penna. Fancy	Penna. A	Penna. B
Aiken Red Arkansas Black Baldwin Black Ben Davis Gano King David Red June Spitzenburg Winesap Other Solid Red Varieties	75%	25%	None required

### STRIPED OR PARTIAL RED VARIETIES.

Varieties	Penna. Fancy	Penna. A	Penna. B
Alexander Arkansas Delicious Fameuse King Lawver Jonathan McIntosh Stayman Wealthy Missouri Pippin	50%	25%	None required
Ben Davis Geniton Northern Spy Oldenburg Home Wagner Willow Twig York Imperial	50%	15%	None required
Gravenstein Jeffries Twenty Ounce Wolf River	25%	10%	None required

### RED CHEEKED OR BLUSH VARIETIES.

Varieties	Penna. Fancy	Penna. A	Penna. B
Hyde King Maiden Blush Red Cheeked Pippin Winter Banana Other Red Cheeked or Blushed Varieties	Blushed Cheek	Tinge of Color	None required

### YELLOW OR GREEN VARIETIES.

Varieties	Penna. Fancy	Penna. A.
Rhode Island Greeting Albamarle Pippin Other Yellow or Green Varieties	Characteristic Color	

### Definition of Grade Terms

As used in these grades:

"Well formed" means having the characteristic shape of the variety.

"Uniform in size" means that there shall not be more than one-half inch variation between the maximum and minimum diameter of the apples in any package.

"Practically free" means that the appearance or the keeping quality of the fruit shall not be injured to any extent readily apparent in the process of grading or sorting.

"Materially deformed" means sufficiently deformed to cause a loss of 25% or more by volume in paring.

"Materially discolored" means having more than 50% of the surface sufficiently discolored to injure the appearance of the fruit.

"Colored" means the color characteristic of the variety when mature.

"Mature" means having reached the stage of maturity which will insure the proper completion of the ripening process.

The 1920 season has been rather abnormal as far as weather was concerned and the color which the apples developed was considerably more than can ordinarily be expected. Bearing this fact in mind, the 1920 crop can not be taken as an average test of the specifications of the grades as far as color is concerned. On the more important varieties which are grown in the southern part of the State this year indicates that perhaps the amount of color which will be fair may be increased over the percentages named in the grades. However, it is not wise to make such a change permanently until at least one more season's experiences prove that this is practicable.

Another point of considerable importance in the grades is the amount of tolerance which should be permitted. The Federal Grades state that 10% in each of the grades shall be permitted to take care of mistakes in packing. On the other hand, some of the growers in the State did not believe that it would be fair to make the same tolerance in all cases as the Fancy Grade necessarily would be packed much more accurately than B Grade. For this reason, the 5%, 10% and 15% tolerances, respectively, were adopted for trial. Up to the present time the answers from those growers who followed the grades in 1920 indicate that each of these two systems is about equally popular with them. The criticism of the straight 10% tolerance is that Fancy apples should be graded closer than this. On the other hand the criticism of the sliding scale is that 15% of tolerance in the case of B Grade will mean that 15% of the apples may be cull fruit



and, therefore, practically one-sixth of the B Grade may be decidedly inferior stock.

During the next year we hope to continue this work and at this time I desire to state that we believe that we should have these tests continued on about one hundred farms in various parts of the State. Later in the season as the crop has been set more of you will be asked to help in this work and we hope that you can give us co-operation in determining on a purely practical basis just what can be done in getting a set of specifications suitable for the various parts of the State.

**Mr. Chase:** Do you not think it would be desirable to have size requirements?

**Mr. Taylor:** That is already attended to in the regulations.

**Mr. Atkinson:** Why is the sizing not made closer? It seems to me that in selling apples if the sizing is made closer, it makes a better package and sells better. I would not be willing to grade my apples with as much variation as those which are exhibited in A Grade.

**Mr. Taylor:** In closed packages the size is required by the apple packing law to be marked. There is absolutely no control of any kind on what is sold in any other way, and that is over two-thirds of the apples of the State without question.

**Mr. Atkinson:** You mean that this size given is the minimum?

**Mr. Taylor:** You can sell apples one inch in diameter. You can ship any size you want, provided you mark it in one quarter inch size, and provided it satisfies your market. In consideration of the size of apples, and in consideration of color of apples, these are entirely different matters. I wrote one man three times before I convinced him that the size did not grade the apple. He figured that the number of apples in a bushel should determine the grade of the apple. That was one man's belief.

**Mr. Atkinson:** What degree of color approximately do you set as standard for fancy grade?

**Mr. Taylor:** Depending on the variety, according to these charts. On the different grades it is different. This is well illustrated in the charts that I have here.

**Mr. Chase:** Do you consider it practical for a man to put in not only size but what you call perfect apples? Is it a practical proposition?

**Mr. Taylor:** In one packing house in West Virginia these same specifications were used on about seventy cars, and not a single car was rejected, because of quality, or for any other point. We have with us a representative of the U. S. Bureau who has been active in getting these grades

together, so that any points can be very well passed on to him, because at Washington they have given them a great deal of consideration. The people want something that will be satisfactory in this line. These men want a set of uniform regulations extending from Virginia up the Valley to Harrisburg, and it is safe to say it is coming without question, and we are anxious to do these things and do them without any mistakes if possible.

**Mr. Breidenbaugh:** How about varieties such as Rome, Hubbardson, Stark and Summer Rambo?

**Mr. Taylor:** Will Mr. Stillwell answer this?

**Mr. Stillwell:** I believe the Bureau has not worked out definite variations on different percentages of color, but they would fall within the general class. We have divided them into various classes, and we would be very glad to work out percentages for those varieties. I can not give the exact percentages right now, but they would fall within the general class of similar varieties and line up with other varieties which we have listed.

**Mr. Fenstermacher:** Perhaps Mr. Hetzel can say something to us on this subject.

**Mr. Hetzel:** I feel rather like an outsider in entering into this discussion, but I would only like to say that before any such grades or rules are adopted I hope that you all may give the subject the most careful consideration. I do not want you to think I am against grade laws, because I am much interested in them and feel that the establishment of grades is a step towards improving our industry, but it is something that demands most careful consideration. If all of the growers will give this matter their best attention and consideration, they will be able to work something out of it that will be of value, but it is not a simple thing. The present recommendations are all right in theory, but it is very easy to put something in a grade law which is not practical. Mr. Taylor has pointed out that Fancy Grades do not concern us, but I think that they do. Apple growers, this will appeal to you. Suppose you had a block of Yorks of especially high color and excellent quality. It surely should be packed as "Fancy Grade," in order to sell to the best advantage. On the trees the fruit looks fine, but as it goes over the grader, you find of course that it is not absolutely perfect, and according to your present proposed law each apple has to be absolutely free from all kinds of defects. What then will you do with a splendid red apple with an insignificant little russet spot or similar defect? Since you are packing "Fancy" you will not have enough apples which are slightly defective or off color to enable you to pack in "A" grade, so the only thing you can do according to this law is to throw such apples all the way from



"Fancy" down to "B." All that the tolerance provided can possibly do is to allow for mistakes in grading.

I do not want to appear as opposing the grading proposition, but it is a very important subject, and something that will effect your pocketbook if you are not careful. If you are going to establish this sort of grading, I just want to say that you should look into it very carefully. It is the right principle, but be sure that you do not tie yourself up by any legislative action too soon. I have seen it too many times, and have studied and watched it. Either the thing is not enforced at all, or if it is enforced it is not uniform. It may be all right in principle, but often it is not worked out properly.

**Mr. Pratt:** A point has been brought out by the last speaker which I think it worth speaking of. He says if you can't put in second grade or "B" grade apples in Fancy packs, why we will lose money by it. The truth of the matter is that we are losing money in our Fancy Pack because we are allowing lower grade apples to get into that pack, and that is the reason our eastern apples will not stand up in the market with western apples, because when a customer buys those apples, supposed to be of standard 90 to 95 per cent, he does not get nearly that much. I believe that the sooner we come to a high standard of fruit, whatever you call it, so that the customer will know that you can expect as many high grade apples in that pack as you do when you buy a box of Fancy Western apples, the better it will be. There is always a certain allowance that is made because of the frailty of human nature. You can not pack all 100 per cent. apples, but we must not put too many mistakes in the package, but let us come to a standard as soon as we can, and stick to it, and then the eastern apples will be able to complete with the western apples.

**Mr. Linde:** It is my opinion that apples that go in "Fancy" grade should be fancy. We can not pack them too good, and I think the time has come when this Association ought to put out a stamp to members who are willing to follow these laws, and give them a stamp to put on their packages, leaving the public know that these growers have passed the approval of the State Horticultural Association in regard to these laws, and I believe that it will be an aid in selling the apples. Consequently, I think that there should be no "Fancy" grade apples in barrels. "A" grade is all right, but put your "Fancy" grade in a box. That is the reason we are getting three times the price for Stayman and Delicious that we are getting for other varieties.

**Mr. Chase:** Why boxes, why not hampers?

**Mr. Atkinson:** I know, of course, that I am a younger grower than most people here, and have had much less experience, and I have a smaller place, but if I can see any-

thing about the apple industry it seems that what is the matter with the Pennsylvania growers is that they are too lax. We have apples packed on the market at \$2.50 a barrel, while Fancy apples not many miles away have been selling at \$5.00 a box. Now then something is wrong when Western apples sell at such difference in price, when we can grow them just as well. The trouble is with our methods. A man in New Jersey says that he has been competing with the Northwest in the production of apples, and that he has produced and sold his apples on his own farm at \$5.00 a bushel in boxes. This was for Fancy grade, and they preferred his own apples at that figure. At the same time we have in Philadelphia apples that will not sell at \$3.50 a barrel. Now then let us settle upon a real standard, and stick to it, and get something definite. I for one do not think the classification is too strict. It ought to be stricter.

**Mr. Taylor:** I want to add a few things. The reason why every one of these apple laws passed in another State were not lived up to, was because they were not doing the best kind of work. Massachusetts is doing the best work of this kind in the East; New York State is not enforcing its packing laws. I went to Rochester, and no man can be found there who is enforcing it, and the quality of the fruit that is coming into Pennsylvania is not up to what it should be. It is not up to what we would expect from growers of good quality. Maryland has never made any effort to enforce their law which they passed there, and just let it go. The same thing, to a considerable extent, is true of West Virginia, except that I know that they are trying to educate growers to pack. No one any place can comply with specifications of this kind without knowing how to do it. That is what the Farm Bureau is for, to educate the farmers to pack. No one any place can comply with specifications of this kind without knowing how to do it. That is what the Farm Bureau is for, to educate the farmers to pack their apples, so as to sell them to the best advantage. I am glad to hear the comments on both sides of the case. We are basing this work on the statement of Doctor Fletcher's talk. Less than fifty per cent of the apple trees in Pennsylvania are in bearing, and yet we have a glutted market this year. We want to ask your help this next year, and we hope to get it. The Bureau of Markets has the authority to make these grades when they see fit. We hope that before any more to change the law is made that the advantage will be so clear that it will not be necessary. We will be glad to help anyone in their packing this next year along this point. More will have to be done in the way of education than in the way of enforcement. Do you men know that the point that is of most interest to the Northwestern apple growers is "How are the Northern New York packing houses getting on," and "what do you think of them?" Because when the



New York apple growers pack correctly, the Northwest profits cease to exist, and if New York gets that thing straightened out, Pennsylvania people will be in the same position with reference to the Northwest. You have to have something practical before you have anything to start on. Please understand that this is our stand on this subject. We want the support of every good apple grower in the State for its enforcement, because beginning next season we believe it will be fair to put some of the "kick" into the law that is provided in it, after giving every person a chance to know what is required by the apple packing law at the present time.

**Mr. Breidenbaugh:** In speaking of these grades. An endeavor was made to make them practical. The gentleman on the other side spoke of not having them too stringent. It might be interesting to know that the grade law of Washington for 1920 has some of the very rulings of these we have. The Northwest grade law is almost the same as this. Practically all of the grading there is the same as for the Northwestern States, so that I can not see that they are too stringent. If anything they are not stringent enough, but I well realize that for practical purposes of getting it started we should have simplicity. Every man should put his apples in the grade where they belong, and if his apples are of "B" grade, they will bring more to pack them as "B," than if he packs as "Fancy" and tries to get away with it. He will get more by packing them as "B" grade, because everyone buys them on their merit. As has been expressed here if we want to compete with the Northwest we have got to get down to some definite way of competing with them, and we never will do it until we get to strict grading rules, and, believe me, they are watching that. They know that upon the fact that we do not grade strictly lies their advantage. If you have "Fancy" apples, and put them in barrels they will bring just as much as in boxes. The fact that they are in barrels does not rule them out of the "Fancy" class. We well know that it is not possible to have 100 per cent perfect apples, but we should grade according to the best rules and regulations. I think that this law should have some variation, but in the main it is all right. Hubbardson, Stark and Summer Rambo ought to be placed in the 50-25 group, and there are a few others that should be varied.

**Mr. Fenstermacher:** I say let the top of your package represent the entire barrel. Now I want to introduce to you a former President of the Society, Mr. Lewis, who will say something to us.

**Mr. Lewis:** I feel that this is one of the best meetings and programs that we have ever had. For two or three years now our annual meetings have not been pointed in

their aspects, and the proceedings have not been printed, and I understand that there is some chance that it may go by this year because of lack of funds. Now yesterday afternoon when we elected our new President we pledged to him that each one of us would try to get a new member during the coming year. I do not doubt that every member could get a new member for the coming year, and I do not doubt that you intend to do so, but do not let us be caught napping. There never was a time when we needed an Association as much as we do now, and I am going to suggest to you that everyone of us who has promised to get a new member, shall pay in advance for that member. If we do not get the new member, then we will be out the two dollars. I am going to do this and hope more will follow.

The following members followed the lead of Mr. Lewis and each guaranteed a member by paying the fee.

Royden Breidenbaugh	Irwin Longenecker
Guy Mayer	James M. Balthazer
Dickenshied & Weinbrenner	L. M. Marble
W. B. Baldensberger	H. S. Stoner
C. A. Hawkins	M. Blain Stock
R. M. Renfrew	E. W. Brandt
B. M. Kennedy	C. F. Weaver
S. C. Eshelman	R. F. Criswell
C. J. Tyson	W. C. Tyson
E. C. Tyson	H. C. Brinton
Fred Satterthwaite	H. M. Anderson
George Pollock	W. J. Lewis
E. B. Hawkins	Elias Vogel
N. H. Love	Levi Horling

The Committee on Resolutions then presented the following Resolutions (by Mr. Greist):

Whereas, the Chamber of Commerce of nearly all of the cities of the eastern part of the United States are doing all in their power to revive the old daylight saving law, which proved so objectionable to farmers of the East, as well as those of the West, therefore, be it

Resolved, That the Pennsylvania State Horticultural Association at their Annual Meeting so protest against this very objectionable piece of legislation, injurious alike to fruit growers and farmers.

Resolved, That a copy of this be sent to our Governor, and also to each and every member of both branches of our State Legislature.

Be it Resolved, That the State Horticultural Association of Pennsylvania approve the work of the Bureau of Markets in their efforts to standardize fruit packages and grades.



Be it Resolved, That the State Horticultural Association favors such appropriations to State College as shall enable it to expand its many activities for the advancement of Pennsylvania agriculture, and particularly to provide increased facilities for instructing students, over 1000 of whom were refused admission last fall because of lack of accommodations, and that a copy of this resolution be sent to the Governor of the Commonwealth, to the Appropriation Committee of the Senate and to the General Assembly.

The above motions in form of Resolutions were presented to the Society, and passed unanimously.

The meeting was now turned over to Professor F. N. Fagan of State College.

**Prof Fagan:** We will take up Question No. 5 first, because a member has requested that we do so, as he wishes to hear something on the subject before he is compelled to leave the meeting to catch his train. Who can tell us something on "Short Cuts in the Removing of Pruning Brush?"

**Mr. Balthazer:** We got a brush rake last winter, and we have found that it is one of the best possible arrangements. We push the brush entirely out of the orchard. You can never haul it with anything else as quickly as with that. The teeth are about six feet long, and when you load it you put the teeth down. You can put a big load on it. Of course, it takes a little patience until you learn just how to use it.

**Question:** How is it propelled?

**Mr. Balthazer:** By horse power. It is a push rake, or sweep rake, or stack rake. All the larger machinery manufacturers have these listed in their catalogs. They are certainly a good thing for an extensive orchard man. We got ours from Sears-Roebuck.

**Mr. Pratt:** I do not remember where it was, but some place in New York State a man had several big sheets of iron on low wheels, he hauled this through the orchard, and the brush was thrown on it, and then the brush was burned as it was cut.

**Member:** Mr. W. E. Grove, York Springs, has a machine of that kind.

**Mr. Tyson:** We take poles twelve feet long, and put them on running gear or a wagon with a cross piece behind, and put it right over the fire with two men on each side, and we have found that an easy way to handle it.

**Mr. Renfrew:** An inexpensive arrangement can be made of ordinary flat, ten-foot square galvanized iron.

**Prof. Fagan:** Now we will take up the first question—"Common Storage at the Orchard."

**Mr. Marble:** Common storages are in use because they feed the local markets. Mr. Lewis has a storage which he has operated for a number of years, and others of us have had storages in operation for five years or longer. They are valuable because they hold the crop from time of picking until late spring if properly constructed without much loss. They lessen the picking crew which you have to have at picking time. You can pick and carry into your storage, and then when a rainy day comes you can do your packing, or if the weather is good, as this year, we did all our picking, and then after picking, the picking crew went in and had as long as they wanted to pack. They are also valuable for use in connection with apple butter operations. We are using inferior grades in that way. The men who are busy from the first of May until the first of November making and gathering the crop will be busy from the first of November until the first of the following May putting up the crop, doing various things. It does away with the dull time when we have not much to do, it makes every day a day of work and production.

I have prepared a Resolution with a preamble, which I would like to read, and if this is seconded, and after any further information desired has been given, it can be passed to the proper persons and presented to members on the floor. The Resolution reads as follows:

"More than half of our commercial apple crop and most of our vegetables are marketed in local markets throughout as long a period as they can be kept in condition. This necessitates storing them at the farm and therefore in storages where there is no artificial refrigeration. There are few farm storages that at present are giving entire satisfaction. We know little of the fundamental principles underlying the successful farm storage.

Owing to our unsatisfactory storages and to lack of sufficient storage space too large a proportion of our fruit and vegetable crops is sent to market as soon as harvested. Last fall this resulted in a market disorganization that cost our growers thousands of dollars. Therefore,

BE IT RESOLVED that the Pennsylvania State Horticultural Association request the Dean of the School of Agriculture of the Pennsylvania State College to consider the advisability and the possibility of undertaking investigations of the problems of storage of fruits and vegetables and the utilization of inferior grades in by-products."

The motion was presented before the Association, seconded, and passed.

**Mr. Brinton:** Is it necessary for something to be done



for common storage? I would say, yes. I have had a common storage for five years. My cellar is an all concrete construction, and that was one of the points that I considered so that it would not be too dry, and if it were too dry I could make an opening in the center and have a spring of water there. The common storage saved my crop of apples this year. As the gentleman has just said a few moments ago it saves time in getting in the crop. Heretofore I have not had any serious help shortage. This year I had very little help, and it was impossible to do more than take the apples off the trees. We filled the storage, and we had a great deal of surplus that we had to store around at other places, and I was fortunate in getting sales for cars in bulk. When I built the cellar I thought it was ample. Also, when I built my cellar I could not get any real good data on the subject. I studied the matter over for two or three years at least, and I gathered information wherever I could get it, and talked with a fellow here and there who had a common storage, but I could get very little. I do not recall that the State Department had any data, and the Federal Department had very little. My cellar should be larger. Also, if I built again I would not use cement. I built this in the side of a hill, thinking that by building there I would get good insulation in the ground. The cellar is perhaps three-fourths under ground, and the first two years after building I did not cover the roof, but later I covered it with two or three feet of ground. I would not do that again, as it is better to have just the plain concrete roof. The U. S. Government at the present time have some bulletins on construction of these cellars, and before building again I would consider these very carefully.

We did not stop to study the point of moisture as well as we should have. It is not only a matter of keeping out the cold, but getting moisture as well. Some seasons I have had apples in this cellar, and also in cold storage, and I found that Yorks in common storage held up within two or three weeks of those in cold storage. That is doing very well for common storage.

**Question:** How did you store?

**Mr. Brinton:** In open barrels and in field boxes, but I prefer the field boxes. The fruit keeps better.

**Question:** Have you tried storing in bulk?

**Mr. Brinton:** No.

**Mr. Lewis:** We should all understand the advantages of common storage. I am not sure, but I think ours is about the oldest in the State, having been built about fifteen years, storage for apples, and nothing else. I have some ideas concerning specifications, and I suppose every fellow who has a storage has a pet hobby on the subject, and thinks he has the only thing. Without spending an hour's time telling

the advantages of common storage, I am going to mention one specification that I would insist on being used in any common storage that I would build. The first specification would be that it must be rat proof. Everybody who ever built one will have this same experience—that it must be large enough. We, on building started in our own way, got along nicely, and the apples kept fine. We never had any trouble. It was very successful until this year. Now this year come another question, and that is, that we built it entirely too small. As a second specification I would want to use enough of the storage for air space. We store altogether in bulk. We have bins and put the apples into the bins, and they have kept in good shape.

We pay no attention to moisture. With a little judgment and a little care in your ventilation, this moisture question will take care of itself. The same can be said as to temperature. It is important to look after these points though.

There is another thing. It is very important to get the apples in storage as soon as picked, and then keep as nearly an even temperature as you can keep. Be careful when you change your air, that the temperature does not vary. In other words, keep the temperature all the time going lower and avoid variations. Our ventilation is all through the room.

**Question:** What is yours made of?

**Mr. Lewis:** Concrete. We first lined the bins with boards, but the apples rotted, and we took that out, and we have found after using various things that the concrete is best.

**Question:** How many ventilators do you think there should be in any given space?

**Mr. Lewis:** I should say a square foot of ventilating surface for each twenty square feet of roof.

**Question:** If you were building again would you consider inlet ducts coming from the ground any distance? Would this temper the outside air?

**Mr. Lewis:** I would not.

**Question:** How low do you allow the temperature to get?

**Mr. Lewis:** 34 degrees, but no lower.

**Mr. Kiser:** We have a common storage. It is built with concrete walls. It is concrete entirely. The ventilation is from the top of the walls all around. It cools off very rapidly at night by opening the outside door.

**Mr. Leshner:** I would like to make a few additional remarks in regard to common storage. Some systems described are very elaborate, so much so that we might feel frightened at them. I think we need not fear low tempera-



ture. I very much desire a temperature not over 32 degrees. I think that something lower than that would be all right. I have it lower at times, and do not experience any bad effect. On the other hand, I do not see the occasion for very elaborate ventilation. If there is a hole at the top and a hole at the bottom the air will circulate, and so I think we can have a very much simpler method than some of the elaborate ones which are described.

**Prof. Fagan:** It is very evident that there is much to learn about storage. There are a great many ideas, and it is surely a thing that we should give attention, and all the ideas suggested should be very valuable to all here.

**Question:** What does it cost to store?

**Mr. Lewis:** We figure it costs a cent per bushel per year for storage charges.

**Prof. Fagan:** We will now take up some questions sent in from the floor.

**Question:** Does powdered lime-sulphur give as good results as liquid lime-sulphur? Which is the cheaper?

**Mr. Walton:** In my experiments with Frog Eye on York Imperial I got practically as good results with Sherwin-Williams dry lime-sulphur as with the commercial lime-sulphur in liquid form. I say that I got practically as good results from Frog Eye. I do not have much data on other diseases, because Scab did not attack the York Imperial very seriously this year. I found that by using the strength they recommend,  $2\frac{1}{2}$  or 3 pounds to 50 gallons—I usually used 3 pounds in 50 gallons—that at that rate 100 gallons cost 66 cents, as I figured it last spring. I also figured that the commercial lime-sulfur cost the same to a cent when used at the strength I used it, exactly the same, 66 cents for 100 gallons.

**Prof. Hodgkiss:** From the insect end it all depends upon the amount of sulfur in solution. We all know that lime-sulphur has a certain amount of sulphur in solution. In order to get most effective results in San Jose scale, or Scurfy, or Oyster-shell, if we use dry lime-sulphur we must have the same amount of sulphur in solution to be effective. In using for the San Jose scale it is as effective when used at the same strength. If you have a bad dose of scale it is advisable not to use a weak strength of this.

**Question:** If mice are so destructive to orchards why not have our foxes protected as they are the greatest destroyers of mice we have in the country?

**Prof. Fagan:** What will our poultrymen do then? We can get rid of the mice by going after them hard, and I am afraid the poultrymen would be right on the Legislature fighting a game of this kind, and also our sportsmen who like to hunt game animals.

**Question:** Would foxes be thick enough to keep the mice down on a sod orchard?

**Prof. Fagan:** I hardly believe they would.

**Mr. Pratt:** I think the experience we have had in controlling mice would be of some value. It is by the use of a poison made by using sweet potatoes, 3 quarts, to  $\frac{1}{8}$  ounce of sulphate of strychnia and  $\frac{1}{8}$  ounce of carbonate of soda. This has proven an absolute remedy for mice with us. Drop it in the holes which the mice make. On one block of 5500 trees three years ago we had three trees damaged. We have controlled the mice trouble completely. You can easily follow the holes and get rid of them. You do not have to get every one of them, but I am satisfied that we got 95 per cent. Put the material on in the fall. Cut the sweet potatoes into dices, and put the poison on them. Go along in the orchard, and when you see the holes that look like snake holes, just drop this material in. If you go along and get most of the holes you will clean them out, or kill enough of them.

**Member:** If you will introduce blacksnakes into the orchard it will do the trick. We have one section of seventy acres, and practically no mice, because we encourage the blacksnakes. They will not hurt you, and they do a lot of good.

**Question:** A spray agent operating at this show claims fungicidal qualities for lead arsenate. Are these claims supported by fact?

**Prof. Fagan:** It no doubt has some fungicidal value.

**Question:** Does anyone here have trouble with something that looks like a cricket about the middle of August until the weather gets cold? It eats the apples, making holes.

**Prof. Hodgkiss:** I believe you have in mind the tree cricket. Spraying with arsenate of lead is advisable.

**Question:** Is that a sod orchard?

**Answer:** Yes.

**J. S. Brenner:** What is the most common floor used in common storage?

**Prof. Fagan:** Of the number with which we have heard from at this meeting I would say that probably stone, concrete, or brick is the most common.

**Prof. Fagan:** Now we will take up questions Nos. 6 and 7 together. "Have we been over pruning the apple tree? What are the vital points in fruit bud production?"

**Prof. Anthony:** To go back to the young tree we can give you the results of two or three experiments carried on in this State, where the results are very conclusive. At Ithaca they rubbed off the buds that were on lower portions



of one of the trees, and on other one-year trees they left the buds on the lower portion. In one series we left them also and cut them off in another, and at the end of a year just that slight pruning in those one-year old trees had thrown them a little more than twenty-five per cent behind the other trees. I bring this out because it brings us to the fundamental principle of all pruning, and that is that the leaf is the factory in which the tree forms its food. You may have a soil rich as it is possible to get it. It is absolutely of no value until it has come into the leaf. Anything that is done to remove leaves checks the tree by just that much. I am not advocating no pruning, I am simply trying to bring out the principle and show what happens when we do prune. On other experiments in nearly every case we found that the young trees were best that had least pruning, and at the same time we must bear in mind that we want a tree to bear a crop, which means a good frame work, and so at time we must prune to get that frame work, and in doing the pruning keep in mind that the least pruning possible is going to give us the most hopeful tree.

For the trees 35, 40, or 50 years of age I am going to tell you that pruning may be restored to stimulate the tree. That looks as if I am telling you two different things. If you go to the outer branches and trim them off, immediately back of the cut you do stimulate it. The new growth, however, may not be sufficient to balance it, so that the tree as a whole may be sickly. At all times bear in mind the principle involved, and do as little pruning as possible to get what you want.

Concerning fruit bud development. We have had a great deal of investigating work going on along that line, and we will know more later.

In the apple the fruit bud that bore its crop this year was formed the previous year, and our fruit crop of this coming year is now on the trees in the shape of fruit buds. If you will cross section them with a Gillette safety blade, I presume you can see the parts there, with a magnifying glass at least, if not with the naked eye. The fruit crop is there, so that the treatment of the tree at that time is a vital treatment. The blossom is only the potential fruit. Lots of things must happen before taking the fruit off and the formation of fruit next July, and the treatment of that blossom spur at the time of blossoming is beginning to loom up as an important factor.

Primarily, lack of vigor at the time of blossoming, or a few days before, or a week before, or lack of cross pollination (we know that some fruits will not set fruit without pollen from another variety), also insufficient nutrition at the time the pollination act is taking place, all are cause of trouble. If we have those things cared for, and see that

the leaves are in good shape, our chances for a crop are very good. The Cornell Station at Ithaca, N. Y., has some excellent circulars on this subject.

**Question:** When is dehorning of the apple desirable?

**Prof. Fagan:** Personally, I believe never.

**Question:** In the orchards that were planted thirty feet apart with interlocking branches, would you take out half the trees as we were advised some time ago?

**Answer:** That depends on the variety. Baldwin, Spy and Russet become quite wide-spreading varieties. I believe you can take out every other tree.

**Question:** Do you approve of the open head?

**Answer:** Not necessarily. Yes, and no, at the same time. We can have a perfect open head tree. We can also have a perfect central leader tree or a perfect modified leader tree. Such is training not pruning.

**Member:** I have seen in Delaware County where they take almost everything out.

**Answer:** Unfortunately, or fortunately, we have fruit growers getting along in spite of some of the things that are done.

**Question:** What is the relation between pruning and water sprouts?

**Prof. Fagan:** Quite a bit. The more you prune the more you are apt to have water sprouts, providing fertilizer and cultivation are being taken care of in the orchard.

**Question:** Would you take out water sprouts?

**Prof. Fagan:** If they are interfering with any operation of the tree, yes.

**Question:** When?

**Prof. Fagan:** At any time in the summer time jerk them off. If you let them go probably two or three will come up when you cut them off in the dormant season. I would not let them crowd themselves out. Eventually they would die, and you would have to take them off anyhow. They should certainly come out. They are filling in space which you want to use otherwise.

**Question:** Did you ever see water sprouts made into fruit spurs?

**Answer:** It is a question of light getting to that water sprout. It will make a fruit spur if it gets the light to develop the plant food in the foliage.

**Question:** Is it advisable to allow the fruit spurs on the trunk of the tree to develop fruit?

**Prof. Fagan:** It can't break the trunk. It is a good place to have them. Personally, I like to see them from the end of two year's growth on down as far as I can get to them.



**Prof. Fagan:** We will now take up Question No. 2.—“What is the Status of Dusting in Pennsylvania this year?” Will Mr. Hershey answer this.

**Mr. Hershey:** We have not dusted apples. We had such an unsatisfactory experience last year that we did not depend on that. We dust the peaches. In one block of apples that have no peaches we do not dust. We spray. We had such a bad dose of Scab this past season a year ago that we do not put any confidence in dusting for control of Scab on the apple.

**Question:** What material do you use?

**Mr. Hershey:** Different materials. We mix it ourselves.

**Question:** How many times do you dust?

**Mr. Hershey:** We dusted four times.

**Question:** Where did you get your materials?

**Mr. Hershey:** I do not recall where the dusting materials came from.

**Question:** How about hydrated lime?

**Mr. Hershey:** If you use hydrated lime you should have it good and fine.

**Question:** Now what about dusting apples?

**Mr. Hershey:** I have nothing to say about dusting apples.

**Prof. Hodgkiss:** I do not want to say much about it. I do not really believe there is so much difference between dusting and wet sprays. The experiments that have been conducted in New Jersey and Connecticut last year show control of certain insects. When you come to the chewing insects I really do not think there is much difference, except perhaps there was less control of Curculio by dusting then spraying, but we are up against it in the disease end. As long as dusting will not control the diseases, and does not control the insects any more effectively, I say keep to your spray pump, and to your proper sprayer, and to your spray gun.

**Member:** I have a friend who had a peculiar experience in an apple orchard interplanted with peach. He went into the orchard where they were putting on dust, and said, “I did not buy this dust for you boys to drive around with. Put on the dust.” He got on the wagon and opened the duster up enough so that it gave off an excess of dust. I saw the trees shortly after that, and there were a few leaves on the trees in September. The apple trees between were Macintosh, and I have never seen any fruit as perfect as those. He comes out now and makes the statement that dusting is no good for peaches, but is fine for apples.

**Question:** Have you anything to say finally in favor of dusting over spraying?

**Prof. Fagan:** I have nothing to say.

**Question:** Do you feel like advising them to change from spraying to dusting?

**Prof. Fagan:** I use self-boiled lime-sulphur, and I do not care how sticky or sloppy I get. I shall keep on using it, although we are going to dust some peaches and some apples this year, but for the most part we will spray, but understand I am not condemning it. We know of commercial men who are getting results with it. It is as yet an unsettled question. Here is one who says it benefits his apples and ruins his peaches, and here is one who gets good results on peaches but not on apples.

**Question:** How about self-boiled lime-sulphur on apple?

**Prof. Fagan:** On Ben Davis and Rome Beauty in New Jersey the lime-sulphur has been causing injury. That is in southern New Jersey, and they have swung to the self-boiled lime-sulphur, and seemingly are having good results, but it is much harder to make.

**Question:** I have a question to ask in regard to the labor problem in regard to dusting. A number of us have certain dusters we prefer. Would you advise discontinuing the use of dusters and go back to spraying? Also, if you were short of help and it was necessary to make any application in a short time, would you not prefer to dust?

**Prof. Fagan:** Yes, I think the dusting has its place, even on apple if it means that the commercial grower can do nothing else. Then dusting does hold a place.

**Question:** What do you spray for Peach Leaf Curl?

**Prof. Fagan:** You must get Peach Leaf Curl early, and I anticipate that we are going to see a lot of curl where the fellows did not spray in time. It was time to spray before the 10th of January in our particular county, that is to be safe.

**Prof. Fagan:** We are up against a peculiar proposition in this dusting proposition. We have some growers who are dusting and doing no spraying, and they are getting good fruit. I do not know if they would get better fruit if they used sprays. At the College we have sprayed and dusted some last year, and this year we are going to do more. I do not want to make any general recommendation. The plant pathologists are pretty well convinced that in many of their cases it has been an absolute failure, and there are so many conditions under which dusting is unsatisfactory, and some come out with bold statements and say that it is no good on apple. Some have burned foliage, others have not. It only brings out the point more and more that the



State Horticultural Association of Pennsylvania needs to be growing all the time, and I think the attendance this year is a good indication that when there is trouble many come to the meetings. I think the slump this year brings us all out.

**Question:** Is there at present any special apparatus on the market for pasteurizing for bottling cider?

**Answer:** Yes, there is. Many such are advertised in magazines.

### VEGETABLE GROWERS MEETING Tuesday Afternoon, January 25, 1921.

#### THE BUSINESS SIDE OF VEGETABLE GARDENING Address by Paul Work, Cornell University, Ithaca, N. Y.

When organized service for farm people began, attention was devoted pretty largely to cultural methods and a great deal of good was done in that direction. We have now come to think that the business features are just as important as the production features. The question arises at once, what do we mean by the business side of vegetable production? It is impossible to draw a definite line, but we might think of it in somewhat this way. On the one hand there are those who are growing plants for the sake of learning all they can about them, perhaps in experimental or research work, or for the sale of the products themselves as on private estates. Those people are, many of them, highly skilled in the management of plants. They are not concerned primarily in the profits that are derived from cultivation of their crops, so that with them the business side of vegetable gardening barely exists, if at all. On the other hand we may turn to the men who are engaged in making a living by means of the production of vegetables, to the men who are engaged in supplying food for our cities. These are the men who combine production methods and business methods.

Probably the two most important phases in the business side of vegetable production are those that concern, first, cost of production and, second, marketing methods. Either of these is a subject big enough for a book.

In the first place we must recognize that one man cannot tell another how to run his business. No man can come to your farm and tell you how you ought to manage it, because there is not another man in the world that is working under the same conditions. That does not mean that you can not get help from others. Many suggestions can come to you from reading, from attending meetings and

from contact with fellow growers. It seems to me that the contact of one man with another is perhaps the most helpful of all. If a man comes to a meeting and loses the opportunity to see and talk over common problems with other gardeners he is losing one of the greatest advantages of such sessions.

Nothing is gained for the community and nothing for the individual unless production is economical. That means that we must keep our costs down as well as bring our production up. It would be impossible to say what means of accomplishing this are most important, but I believe there are very few factors that will help a man more than careful planning. Most men who are producing crops for market are pretty skillful craftsmen. They know how to use their hands. They can, and do work hard and long, but it seems to me if there is one mistake more general in the vegetable industry than another it is the mistake of not using our heads sufficiently. Now, the dear knows, when a man is in the rush of his growing season, it is pretty nearly impossible for him to do a great deal of studying or thinking about the operations of a month or a week ahead. He thinks chiefly about what has got to be done for tomorrow's market and what he will do this afternoon and tomorrow morning. The broad scheme for the season must be thought out before the rush begins.

Those who drive cars know that we can't keep the road by looking under the wheels. We have to fix our eyes some distance ahead. If we are going to make a trip, say of a hundred miles we look further than we can see with our eyes. We get a map and find out all we can about the roads. Perhaps a good many men will say off hand that we cannot plan garden operations without knowing what kind of a season we are going to have. However, if a man lays a careful plan, he has a basis on which to work when conditions change. Before going even on a short trip one often considers two or three different routes. We often hear a road spoken of as a fine "Good weather route." If the weather is bad it is better to go the long way around. Suppose we make plans for a season's operations in the garden. Having considered the different possibilities, we are ready, when conditions change to pick out the one or the other possibility that we can best adopt. Making the wheels in a fellow's thinktank go round brings mighty good results.

To illustrate, suppose a man is figuring on growing early cabbage. He has not considered very accurately just when it is to be harvested. He plants it when he is ready. He has not thought much about what crop is to follow. Turnips would be one possibility. Carrots would probably bring higher prices and possibly sell to better advantage than turnips. To grow a crop of carrots he must make up



his mind early and plan operations accordingly. He will then set his cabbage plants at the earliest possible moment and make special effort to get that crop grown and out of the way in time for the carrots. We can easily conceive of a difference of a good many dollars per acre on that season's return due to the foresight that this man exercised in order to make room for a carrot crop instead of a turnip crop. Sometimes by a little carelessness a crop is planted so late that it is impossible to follow with any other. Sometimes it happens that by planting a different early crop we can use a more profitable second crop in good shape. This is a simple illustration and one that would hardly be overlooked by very many gardeners. I suspect however that such mistakes are made often enough. We do know that the principle is good.

Another factor is the distribution of labor. If we shape our season's planting with this in mind, we can have a more uniform number of employees throughout the whole season. We will not find ourselves under the necessity of finding a big force at certain times and then letting them go again. That does not make for economy of labor.

Another point is early purchase of seed. Suppose we wait until the last minute. It is too late to find out what is the best strain, also the best strains are often sold out early and you will find ourselves having to use a second rate strain instead of a first rate. The differences between different strains of seed are too great to justify our leaving a matter like that until the last minute.

I might go on almost indefinitely with those features that enter into operations. I have spoken of a few of the factors that should be considered. It is necessary to bring all of the factors together and weave them into a united plan. When we get down to it, we see how complex the thing is. The more complex the job, the harder we have to work at it.

I believe in plans on paper. Not very many are in the habit of sitting down with a sheet of paper and lining up a list of the crops to be grown. It is worth while to draw a rough sketch of the farm and lay out a scheme for planting the various pieces of ground. Make it large. Keep it on the desk and make not of any changes during the season. Thus you will have a good record of your seasons operations for future reference.

But the most important feature about this "paper work," as it was called in the army, is the fact that in considering all of the different possibilities one is able to pick out those that best suit his own purposes. Thus can one best serve his market and so realize the highest profits.

Another important factor is cost records. I know what the average gardener thinks of an elaborate system of bookkeeping. With most, such a system is out of the question.

The first step is the making of an inventory of all assets each year. Each man must make his own scheme of bookkeeping. A simple record of receipts and expenses is the next step. The value of such an account is greatly increased by the addition of brief notes showing where a load of fertilizer was used or what field a shipment of celery came from.

As account-keeping progresses, a man's curiosity increases and he soon wants to know which crops pay and which do not. Many vegetable growers have found cost records worth hundreds of dollars in eliminating unprofitable crops that were eating up the returns from the real money makers.

The agricultural colleges are able and willing to assist in cost accounting and there are numbers of good bulletins on the subjects. \*

There are many other factors that might be mentioned in connection with keeping down the cost of production, but time fails. Nor can we take up the myriad business problems that are involved in marketing our products.

A third group of factors concerned with the business side of the vegetable industry may be summed up under the term organization. We know that the American people in general and the American farmer especially have always been individualists, each used to managing his own affairs and not accustomed to team work. But this has changed. As a people we are now highly organized. The farmer has finally joined the procession and the farmer is now backing a vast movement that seems to promise sound development. I refer to the Farm Bureau movement. It behooves every producer of vegetables to join the Farm Bureau and to take an active part in its affairs to the end that his interests as well as those of other farmers may be cared for.

The American Farm Bureau Federation has already become so large and so active that no one industry can expect to get much out of it without going after it very definitely and with a good deal of force. It is almost as much of a proposition to put an idea over with the American Farm Bureau Federation as it is to put it over with Congress. The grain interests got busy very early. A committee of 17 has been at work on the grain marketing problem for months; the livestock people have their committee of 15; the dairy people will have a meeting soon and are going to have a committee to look after their problems. The canning people have a committee, and one after another of these interests are getting together and demanding of the Farm Bureau that their problems be attended to.



If the vegetable gardeners of America do not very soon develop their machinery to the point where they can do these things they are going to lose out. The Farm Bureau is ready and willing to do its part and we can figure that it is the Farm Bureau Federation rather than our own organizations that will do most of the work. It has the power to do things, but the getting together is going to fall to us.

The same principle holds with reference to State movements. The Farm Bureau as an organization of farmers is just beginning to develop in this State. The idea of paid membership with farmers in actual control is just coming. If the vegetable gardeners of Pennsylvania are going to get service out of the Bureau they will have to go after it. The only way to get it is through organization. The fundamental thing of all is that vegetable men all over the country and in this State and in each county of this State must by all means get into the Farm Bureau themselves, individually. If they will do this, giving their hearty support and will then make sure that the Farm Bureau realizes the nature of their particular problems, this movement will yield service that is far beyond anything we can imagine now. Thank you.

### GOOD SEED

By Dr. Paul Work, Cornell University, Ithaca, N. Y.

Seed, to be suitable for use in vegetable production, must be clean, able to germinate and true to a good name. The first two points are the occasion of but little trouble. Our chief problems lie in connection with the third. The factors included here not only affect the amount and quality of the crop but they are also exceedingly difficult to judge in advance. There are but two ways to know how plants from a given lot of seed will perform. One is to grow a crop from a sample, holding the main lot for future use. The other is to know the performance of the parent plants.

Thus arises the question of judging plant performance. Comparatively few have trained themselves to see accurately and comprehensively. Most observers see some features of a plant or crop and overlook others. It is necessary to observe systematically. In the plant we look for vigor of growth, productiveness, disease resistance and time of maturity, along with other points of greater or lesser importance. In the product we seek, among other things, color, form, size, quality and attractiveness. Elaborate note taking is out of the question for most gardeners, but the use of pencil and pad, though very roughly and briefly, serves to center attention on the points to be observed and it aids

the memory in making selections and in carrying on further work.

Having chosen good plants in the field, how is one to be sure of securing seed for future use that will produce the same qualities? There are just two possibilities, barring gift and theft, namely to save seed and to buy.

Saving seed offers certain great advantages—assurance of parentage, selection for ones own ideals, and profit from the sale of surplus seed. Further, there is real satisfaction in developing improved strains. On the other hand, there are required knowledge of plants and skill in judging, together with much labor and painstaking care. Much of the work must be done in the busiest seasons. At best it is possible for a gardener to produce only a part of his own seed unless he confines his operations to very few crops. It is almost invariably necessary to buy some.

There can be no doubt but that many seedsmen are endeavoring to give good service to growers. Nor is there any doubt but that splendid strains of seed exist in the trade. The trick is to separate such strains from those that are not so good. The careful and intelligent buyer is able to do this to a great degree. There are many gardeners who enjoy good service from seed houses, chiefly because they know how to get it. Two or three suggestions that may help in this direction will not be amiss. In the first place, it is necessary to be a discriminating buyer. The gardener knows which grocer recognizes quality and which does not. It is so in all business. It is worth while to become personally acquainted with the seedsman. Thus is developed a mutual understanding of your needs and of his problems that is profitable to both. Most seed houses will, when requested, mention a stock number or other designation by which you can be sure of seed of the same parentage the next season if it is wanted. If that same stock is not available, you may have the advantage of suggestion as to other stocks, with information as to their relative merits. It is generally well to seek the originator, or the introducer of a variety, or a grower or seedsman who has made a specialty of maintaining a fancy stock of that variety.

The question of price in seeds is constantly coming up. The near-sighted buyer—and unfortunately he still exists in large numbers—cares for nothing but price. Little does he realize that the cost of the seed is but a small matter in the cost of the crop though it be vital in the success of the crop. The wise buyer is willing to pay for quality. He does want to be sure he gets it. The whole problem simmers down to a matter of studying the game and establishing personal relations of confidence just as in every other business.



## SOME IMPORTANT PROBLEMS FOR THE VEGETABLE GROWER

By C. R. Orton, Professor of Plant Pathology,  
The Pennsylvania State College.

The vegetable grower and truck gardener have reached the point where they admit that help must be had in controlling the diseases and insect pests of their crops. In many places these factors have become in recent years the limiting ones in successful production. There are at least three reasons for this condition; (1) the parasites of any particular crop are spreading continually and becoming more numerous in any given locality; (2) new parasites are developing continually to all appearances; (3) the methods of growing truck crops without adequate rotation of unrelated plants has led to the introduction of parasites in the soil to such an extent that certain crops can no longer be grown successfully. These conditions have been brought about in different ways. In most cases the parasites have been introduced unwittingly. It is proper to say that in our ignorance we have bought plants which are infected directly, or the soil about the roots was infested at the time they were purchased, or the seeds were infected. In all such cases the results are usually the same—viz. the introduction of parasites into a new region.

Perhaps the most important of these factors to the vegetable grower is the problem of obtaining **quality seed**. By **quality seed** we mean **seed free of disease producing organisms and insects, of good vitality, productive, and pure as to mixtures**. Such seed is difficult to obtain for there are very few seed producers who have the necessary information and expert assistance needed to produce it. One concern, the Pedigreed Seed Co. of Hartsville, S. C., has the staff of experts needed to produce quality seed. Until there is a greater quantity of such seed available where are the vegetable growers to get it? There are two possible ways of securing such seed; either the vegetable grower can produce his own seed or the commercial seedsmen can be trained to produce it for the grower.

In order to do this certain fundamental knowledge is necessary and certain methods must be followed. In the first place the seed producers must have a general knowledge of the crop in question. He must be able to recognize the symptoms of disease in the crop. He must follow certain methods of selection to eliminate the undesirable and diseased plants. Only the most healthy vigorous plants should be used for seed production. In the case of such a crop as tomatoes the external appearance is not always reliable. The fruits must be cut open and the seeds carefully

examined for spotting. Apparently healthy plants often produce internally borne diseases. In the case of root parasites which persist in the soil breeding or selection methods for the development of resistant plants must be followed. It is also important to protect the seed plants from epidemic diseases by thorough spraying during the growing season.

After the growing season and during the process of harvesting, ripening, fermentation and storing of the seed, there are several precautions to be taken. Careless handling at this time is likely to result in seed infestation by insects and seed infection by diseases.

The above considerations are important ones when we realize that practically all of our serious imported diseases like chestnut-blight, white-pine blister rust, potato wart, and many others have been brought into this country on plants or plant parts used in propagation. The wide dissemination of many vegetable diseases in this country is traceable to infected seed—e. g. certain celery diseases, tomato diseases, cabbage diseases, bean diseases, sweet corn diseases, etc. In the past five years we have witnessed the spread of a serious tomato disease to Europe, Australia and almost throughout North America through the shipment of diseased seeds. We must call a halt and only the vegetable growers can do this. A conference should be called as soon as it can be arranged between the growers, the seedsmen, the pathologists and the entomologists in order to discuss these matters thoroughly and formulate some method of action for attacking the problem. It can be accomplished by such co-operation and the benefits to be derived from securing sources of quality seeds cannot be enumerated. They should appeal to every grower of vegetables as well as growers of other plants.

## SOME SERIOUS INSECT PESTS OF VEGETABLES

By T. L. Guyton, Bureau of Plant Industry, Pennsylvania  
Department of Agriculture, Harrisburg, Pa.

Roughly there are about two hundred and fifty species of insects which are serious enemies of the vegetable crop. The number doing damage at certain intervals undoubtedly would be many times two hundred and fifty. Numbers alone preclude mentioning of all. Those which we shall consider are the ones which are most often met and concerning which the greater numbers of inquiries of the office on vegetable insects are made.

A pest now commanding attention is the Japanese beetle. The insect was introduced from Japan into the vicinity of Riverton, N. J., probably in 1916 in the soil about



the roots of imported iris. The insect has spread at an alarming rate. At present it is found in Pennsylvania over an area of eighteen square miles in the vicinity of Philadelphia. The insect feeds on a number of host plants, chief of which are the leaves of fruit and ornamental trees. Corn is the principle vegetable attacked. The developing silk is consumed, resulting in poor filling of the ear. The beetle does its damage while in the adult stage. Its attack resembles that of the rose beetle and it is known to attack one hundred and thirty plants. The feeding extends over a period of from three to four months.

#### Control Measures Employed

At present three lines of control are being used; known areas of infestation are under a strict quarantine which prevents the movement of crops grown with the area without first undergoing an inspection by competent men.

Efforts are being made to prevent further spread by the establishing of barriers of repellent materials put on as dust or spray. These efforts have not been successful up to this time because of the distance which the insect is able to fly.

The developing of some artificial means of controlling the insect. Up to this time all poisons either in the form of dust or liquid have served only as a repellent to the insect. Attempts are being made to develop some poison which will not serve as a repellent. Just now the most hopeful measure seems to be that of introduction of the natural enemies of the beetle from Japan. Two trained men are now in Japan searching for the natural enemies of the beetle. In Japan the insect is of but little importance as a pest to growing crops; and this seems to show that natural enemies hold it in check in that country.

Another recent insect introduction is the European corn borer. This insect as its name indicates bores in corn. In the vicinity of Boston, Mass., is a very destructive enemy of sweet corn. It is thought that the insect was brought to this country in broom corn which seems to have come from Austria. It was first known to exist in this country in 1917 when the insect was found to be thoroughly established over considerable territory in the vicinity of Boston, Mass. Since that time outbreaks of the insect have been found in New York, Pennsylvania (Erie County), and in Canada near Lake Erie. Judging from the behavior of the insect for the last two years in New York, it seems likely that is a field corn pest it does not have the same frightful behavior as it did when only its behavior in the vicinity of Boston was known, but as a pest of sweet corn it still promises to be a very grave offender. The infested area in Erie County was very closely watched through the season of 1920 and no more larvae was found, so it would seem that

the clean up was complete in that area and that we are to be spared from the ravages of this pest for a little longer.

Continuing the list of insects attacking corn the corn ear worm should be mentioned. This is a wide spread insect, doing harm in the south to cotton bolls and attacks okra, pepper, egg plant, pumpkin, melon, and others cultivated and wild plants. The female lays from five to six hundred eggs and there are probably two or three generations per year. The most practical means of control in corn is to dust the developing silk with a mixture composed of fifty parts (by weight) of powdered arsenate lead and fifty parts of dusting sulphur. This is the easiest applied by means of a small hand duster or bellows. This method of course is to be used only in rather small areas and not attempted on areas greater than ten acres. Tomatoes may be protected with a 4-4-50 Bordeaux to which two pounds of powdered arsenate of lead has been added. Wild plants which may serve as host should be destroyed. Fall and winter plowing will turn up the overwintering from (the pupal) and many will be destroyed by natural enemies.

The corn root aphid is likely to become a serious pest in plots which are put to corn year after year. The insect is small and since its attack is below the ground surface its presence may not always be noted. The effects of an attack of many individuals of this species give the crop the same appearance as in a season of drought. The affected plant is seldom killed outright but are much stunted and usually no ears are developed. Beside corn this insect feeds on the roots of several of the wild grasses as well as cultivated asters and in the south on cotton. To control the pest crop rotation should be practiced. All wild food plants should be destroyed. Plowing should be done after March 15th and the ground cultivated several times by cutting to a good depth with a disk harrow. The cultivating before planting is important because it breaks up the nests of the common field ant which is responsible for the spread and overwintering of the corn root aphid. The addition of fertilizers to promote a rapid growth is commendable.

Corn has a great many other insect pests but no others will be mentioned at this time.

#### Insects Which Attack Tomato, Potato and Egg Plant

The Colorado potato beetle and the three-lined potato beetle are so well known that we will but mention them and give the usual control of two and one-half pounds of Arsenate of lead in fifty gallons of a 5-5-50 Bordeaux. Poison in the form of a dust may be used, but where the sprays for the control of disease are made the addition of the poison to these sprays will keep these species under control.

The potato flea-beetle is a species which does great injury especially to potatoes, with less to tomato and egg



plant. The beetle feeds on both the upper and lower surface of the leaf causing it to turn yellow, curl up and die. The beetle is a small black creature and gets its name from its habit of jumping when disturbed. It seems as though poison sprays are of little service in the control of this pest. Plants well covered with Bordeaux mixture are not attacked and since Bordeaux should be used for the prevention of fungus diseases plots which are cared for properly in this matter will suffer little from flea-beetle injury.

In comparatively recent years potatoes, tomatoes, and egg plants, as well as several other cultivated and wild plants, have been attacked by an outbreak of the pink and green potato aphid. These outbreaks are somewhat local, and at times are quite severe. When undisturbed by natural enemies this species is capable of increasing at an astonishing rate, and the presence of a very few on young plants should occasion concern on the part of the grower. The attack of the insect, for the most part is confined to the underside of the leaves, may escape notice because of this habit until after considerable harm is done. To control through spraying should be done with a solution of soapy water to which "Black Leaf 40" (or some other nicotine sulphate solution containing 40% nicotine) has been added at the rate of one to five hundred of the latter with the former. The spray should be applied through a nozzle set at right angle to the extension rod in order that the underside of the leaves may be well hit. Rather high pressure is an advantage. The spraying should be repeated a second time two or three days after the first, and it may be necessary to give a third spraying. Attempt to make a complete clean-up. Since this aphid may feed on quite a number of weed hosts all weeds growing in fence corners and like places should be cut and thus prevent the breeding and subsequent migration of the aphid from such weeds to the cultivated crops.

For a number of years plant pathologists and entomologists were not sure of the cause of the injury on potato known as "tip burn." In the last three years it has been shown rather conclusively that this injury is caused by the attack of the so-called apple leaf-hopper, or which more recently is come to be known as the potato leaf-hopper. This insect spends the spring feeding on weeds and migrates to potatoes in June. As soon as the "hoppers" reach the potatoes they begin egg laying. It has been shown that a single hopper on a leaf will start the characteristic "tip burn" and in caged plants parts protected were free from "tip burn" while parts exposed were affected. The malady is most injurious in dry, warm seasons and may seriously harm a field of potatoes in a very short time. There seems to be no direct means of controlling the leaf-hopper. Again

we resort to a repellent in the form of Bordeaux mixture, using the 5-5-50 formula and the sprays necessary for blight usually are enough to control the leaf-hopper.

#### Insects Injurious to Cabbage, Turnips, Radishes, and Other Related Crops.

Probably the outstanding pest of this group is the cabbage root maggot. The method of attack is so well known that description is not necessary. The parents of these maggots are flies which are somewhat like the house fly in appearance. The eggs are laid at the soil surface between the soil and plant stem. There are three generations each year and in favorable years a part of a fourth.

Control of the cabbage root maggot is rather difficult. In small plantings of cabbage the plants may be protected by cutting one-ply tar paper in hexagons (six sided), about 4½ inches in diameter. A cut should be made from one corner of the card to the center, and from the center five short cuts should be made to form a tight fitting collar about the plant when the card is in place. The outer edge of the card should fit closely to soil to prevent the fly from creeping under and thus reaching the plant. Of course the card will be of no service if the plants are infested before the cards are in place, hence seed beds should be protected by covering with cheese cloth to prevent the flies from laying eggs on the young plants. In large plantings many growers have been successful in killing off the adult before egg laying with a poison bait. The formula used is similar to the one employed in the control of the onion maggot and is prepared as follows: Sodium arsenite or white arsenic one-fourth ounce, boiling water one gallon, black Orleans molasses one-half pint chopped radishes, cabbage or turnips should be added and be allowed to soak. The bait is best applied by sprinkling about over the plants and fence corners in rather coarse drops by aid of a whisk broom or coarse nozzle on a hand sprayer. No attempt should be made to cover the plants. The point to remember is that an attempt at poisoning the adult fly is being made and all that is needed is to have the poison so placed that the flies may readily find the drops.

Carbolic acid emulsion is more or less successful in killing the infesting maggots.

The cabbage aphid is another species which may cause trouble to the grower of the plants of the cabbage family. Because of the rapidity with which the species multiplies, coupled with the fact that feeding insects cause the leaves to curl, make the control rather difficult. Nicotine sulphate and fish oil soap in water is the standard remedy. The application should be quite thorough and repeated. Rather high pressure in the spray pump is an advantage. Some



recent work done in California is the use of an impregnated nicotine dust gave good results, but the cost per acre was rather high. It is hoped this method may be further developed.

For the green cabbage worm poison sprays may safely be used on the growing plants. One pound of paris green or two pounds of powdered arsenate of lead to fifty gallons of water should be used; or the poison may be applied in the form of a dust using lime or road dust as a carrier, one of the poison, five or more of the carrier.

#### **Insects Attacking Cucumbers, Melons and Squash**

The striped cucumber beetle is a native species and is a most serious pest of this group of plants. The adults attack the plants above ground and the developing young feed on the roots. The insect spends the winter in the adult stage choosing such places as weed patches and crop refuse accumulation. In the spring time these overwintering individuals make their appearance and feed on weeds until cultivated crops are available. The control of the cucumber beetle is a difficult task. Protection of the young plants by covering with cheese cloth covers placed over frames like that made from a barrel hoop cut in two and ends stuck in ground with bows crossing at the top, or square frames made by nailing four boards fourteen or sixteen inches long and six inches wide together. Pie covers such as are used in restaurants to cover food may be used. If care is taken these covers may be used for several seasons. An excess of seed should be planted, and the planting done at different intervals of time. Later the excess of plants are removed. Where cucumbers is the crop trap crops of squash and gourds may be successfully used. Certain cultural methods are of service in control of the beetle. Crop remnants should be promptly removed. Interplanting of early beans; and the use of trap crops as mentioned. Encourage rapid growth of the crop by use of fertilizer. After the plants under the covers have grown so much as to fill the cover, through spraying with a 4-4-50 Bordeaux and three pounds of arsenate of lead (powder) to fifty gallons will protect the plants from attack.

The squash bug is distributed all over this country. Both the young and adult attack the growing crops. Certain cultural methods may do much in the control of this pest. The use of fertilizers to promote rapid growth; crop rotation; and clean fall culture which would include the destruction of crop remnants, are advisable. Recently the use of one pound of fish oil soap in four gallons of water to which is added one-half pound of sulphur and applied as a spray has proved a successful control. Make the application when the insects become numerous. The insects may

be trapped under loose boards at night, killing the insects in the early morning before they leave their hiding places.

The melon or cucumber aphid may at times be the cause of a considerable loss. A constant outlook should be made for the appearance of the pest on the young vines. Small vines may be successfully fumigated with tobacco fumes or with carbon bisulphide. If the last named material is used, use at the rate of one teaspoonful to each cubic foot of space. Place the required amount in a shallow dish and put the dish under the cover. See that the edges of the cover used fits closely to the ground. Fumigation is of value only on small plots. Large fields should have the vines trained in one direction and spraying with nicotine sulphate, soap and water, using a good pressure and fine spray. Be thorough in the application and repeat in two or three days. Destroy neighboring weeds since they may serve as food plants for this aphid.

Two borers may attack the growing vines. The Squash vine borer seems most destructive to late squash. When found in small plantings the larvae should be removed by cutting out. Covering the vine at two or three nodes on the tip side of the cut will frequently save the vine by the forming of new root. The common stalk borer attacks not only cucumbers, melons, and squash, but also a very long list of hosts both cultivated and wild. This insects larvae migrate from weeds to cultivated crops. The attack is to be prevented rather than remedied. The prevention is that of the destruction of the weeds neighboring the cultivated field.

#### **Insects Attacking The Onion**

The onion maggot is very much like the cabbage maggot in life cycle and manner of attack. The control is that of clean cultivation and crop rotation as preventive measures. The poison bait given for the control of the cabbage maggot should be used, chopped up onion being substituted for the radish or cabbage. Beside sprinkling over the plants the poison may be placed in shallow pans placed about the field. The poison application should be repeated once each week.

The onion thrips produces a condition known as "white blast," "silver top" and "thickneck." This insect is very small in size (about one-tenth inch in length) and attacks the plant by sucking the juices from the host. The feeding of a great number brings about the killing of areas of the outer layers of the host cells. This thrips has a large number of hosts which includes several vegetable crops. Onions are hardest hit. Clean methods of culture are of prime importance in the matter of controlling the thrips. Weeds should be promptly destroyed. Refuse of the onion crop should be burned soon after harvest. Avoid planting other host plants near onions. Rotate crop to potatoes, beets, or



spinach. Stimulate rapid growth with fertilizers. Where "sets" are used dip in nicotine sulphate solution about one week before planting. Nicotine sulphate spray with soap added is a successful treatment for the thrips. Good pressure (at least 150 pounds) should be maintained and a fine spray used. A power rig with an extension boom twenty feet long upon the ends of which is a hose and spray nozzle, or gun is to be recommended for use over large areas.

#### Pea and Bean Insects

The pea weevil and the bean weevil are separate species but attack their hosts in much the same way. The bean weevil continues to breed in dry beans while the pea weevil is unable to breed in dry peas. The control is that of fumigation of the infested material with carbon bisulphide at the rate of one-half to one ounce per bushel. Fumigation should be done when the temperature is between 60 or 70 degrees Fahrenheit. Care should be exercised in using this material to keep all fires away since mixtures of the carbon dioxide and air are very explosive in the presence of a spark. A safe treatment is to heat up to 140 degrees Fahrenheit and maintain at that temperature of one hour. Material intended for seed may be safely treated by placing in cold water and cautiously heating up to 140 degrees Fahrenheit, then dry out at once.

The pea aphid at times does a very great damage to pea crops. The control is the same as that for the potato aphid. Since clover serves as the over-wintering host it is well to avoid planting peas near clover fields.

#### Insects Attacking Asparagus

The common asparagus beetle is the most destructive of the insects attacking asparagus. The species is of European origin and is now distributed over all United States. The eggs are laid in early Spring by the female. There are two generations each year. Where cutting of the crop is made every two or three days the eggs will not have time to hatch. Trap plants or rows may be left in the field and sprayed with two pounds of powder arsenate lead of fifty gallons of water. After the cutting season all plants may be sprayed. Poultry will keep the insect under control if given run of the plots. Hydrated lime will destroy the larvae.

#### Cut Worms, Wire Worms and White Grubs— Pests of Many Crops

The cut worms are the larval or worm stage of a number of night flying moths. These worms are smooth naked caterpillars, varying from one to two inches in length. The creatures injure plants for the most part by cutting off near the surface of the ground. All are night feeders. To control in small plots hard picking may be enough. Shingles

or small boards placed near the plants will serve as hiding places. These should be turned over each day and worms killed. Card board cylinders placed about plants will serve as a protection. In greenhouses the ground should be heated to a temperature above 120 degrees Fahrenheit. Over large areas a poison bait made as follows should be used:

Bran .....	20 pounds
Paris green or white arsenic....	1 pound
Molasses .....	2 quarts
Oranges or lemons .....	3 fruits
Water .....	(About) 3 gallons

Mix the bran and poison together while dry, add the molasses (stock or Orleans) and mix to a stiff paste. The above amount is enough for three acres and should be broadcast thinly over the ground in the evening, or the material may be placed under small objects scattered over the field. Furrows may be used to prevent army worm advances.

Wire worms are the larval forms of the group of beetles known as click-beetles. The larval stage extends over a period of from three to six years. Normally they feed on grass roots, but when grass land is planted to some cultivated crop the larvae will feed on the crop planted. Potatoes, carrots, turnips, beans, and cucumbers are attacked. The control is preventive for the most part. Short crop rotation periods and planting to peas or buckwheat will aid in cleaning a plot of the pest. Small bunches of clover dipped in Paris green and partly buried may be used as a poison bait.

White grubs are the larval or worm stage of the June beetle. These larvae spend three years in their development to adults. The larvae are root feeders and when present in any large numbers will do much harm. Potatoes and corn are probably hardest hit by the attack of this grub. There are no direct methods of control. Hogs will root out a great number and poultry will consume all they are able to reach. Crop rotation should be practiced, sowing to some closely planted crop in years when grubs are numerous. Fall plowing, that is plowing before October tenth, is effective in bringing the larvae near the surface where natural enemies may reach them. Adults may be killed by an application of poison to their food plant at the time of flight which is about the first of June.

#### Enemies Other Than Insects

Slugs are closely related to snails, the shell being represented by a small plate-like structure. In certain moist seasons these creatures may eat holes in tomatoes, potato tubers, roots of radish, and carrot, corn, tobacco, bean, celery, lettuce, cabbage, other crops as seedlings may be



injured. To control use the poison bait as given for cut worms. Slices of potatoes upon which white arsenic has been sprinkled will serve as a bait. Bordeaux mixture tends to repel. Arsenate of lead sprays may be of service. Hydrated lime if kept dry will kill the creatures.

Several species of millipeds may be found doing damage about vegetable gardens. The greatest injury is done to sprouting seeds and root crops. Potatoes may at times be badly injured. There are no satisfactory control measures. Small pieces of boards may be used to trap them. Lime and tobacco dust serves as a repellent. Seed such as corn may be dipped in Bordeaux mixture and arsenate of lead (4-4-50 and four pounds of powdered arsenate of lead) and dried before planting with some beneficial results.

The foregoing discussion gives in an incomplete way something of the more common insect enemies of the vegetable grower. In conclusion it should be stated that much may be done in insect and disease control if certain cleanup measures are followed. The prompt destruction of crop refuse, destruction of weeds, and crop rotation are measures every grower can well afford to practice. Get ready for what may happen. Anticipate outbreaks—keep in touch with your county agricultural agent, as he may be able to give information of some approaching pest. The Experiment Station and State Department of Agriculture stand ready to give such service and information as you may desire. Use them.



**END OF YEAR**